

Railway Age

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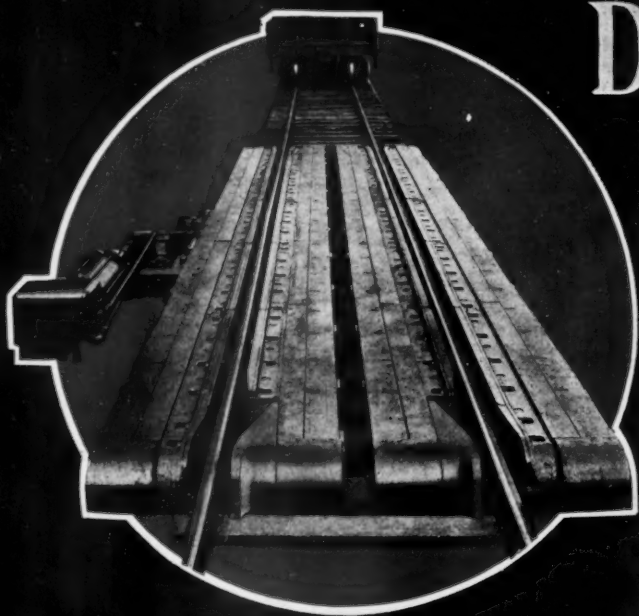
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DAYLIGHT SPEED



NEW YORK

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"Co-ordination" in Transportation

"Co-ordination of different means of transportation" is being offered as the sovereign means of solving the nation's transportation problem. It is being advocated both by spokesmen of the railways and by spokesmen of other agencies of transportation. As, however, it is being advocated by most spokesmen of other agencies of transportation in statements criticizing the policies being followed and advocated by railway executives, it is evident that all those who propose this policy do not mean the same thing.

The *Railway Age* favors co-ordination. We believe it is essential to the public welfare. Unlike most of those who are using that word, however, we will tell what we mean by it. Co-ordination, as we use the word, means a process which would result in each means of transportation handling that traffic which it could handle at the lowest cost, with due allowances for differences in the quality of the different kinds of transportation service rendered.

By "cost" we mean the total cost incurred to make possible the rendering of each kind of service. There might be what was called "co-ordination" under a policy or system which resulted in traffic being divided between different means of transportation entirely regardless of the cost and quality of their different kinds of service, but obviously such so-called "co-ordination" would be entirely unsound economically and therefore contrary to the general public interest.

In what way can true co-ordination be secured? Only by subjecting all means of transportation to similar regulation and compelling each carrier to defray out of its own earnings all the costs actually incurred to enable it to render its service. If the rates and service of one kind of carrier are to be strictly regulated, and the rates and service of other kinds of carriers are not to be, it is obvious that these latter carriers will be free to use methods of getting business that the regulated carriers will not be free to use. If one class of carriers must pay out of their own earnings all of the costs incurred to enable them to render their service, while other classes of carriers have to pay out of their own earnings only part of the costs that must be incurred to enable them to

render their service, it is surely obvious that the former class will have to charge higher rates than the latter class in proportion to total costs of transportation, and that, in consequence, much traffic will be diverted from more economical to less economical agencies of transportation.

Railways Advocate Real Co-ordination

It is needless to say that at present all means of transportation are not regulated similarly, and that all means of transportation are not paying out of their own earnings all the costs incurred to enable them to render their service. Carriers by highway and waterway are not being regulated similarly to the railways. The railways are paying out of their own earnings all the costs incurred in providing their service, while the taxpaying public is paying all the costs of providing highways for carriers on inland waterways, and a large part of the costs of providing highways for the transportation of passengers and freight by motor buses and trucks.

In spite of all the advocacy of "co-ordination," the Association of Railway Executives is the only authoritative source from which there has come a definite proposal of policies the adoption of which would effectively promote true co-ordination, because it is the only organization that can speak for any industry which has proposed that, as regards regulation and the defraying of the costs of transportation, all means of transportation shall be treated alike. The reason why this proposal has come from the railway executives is that the railways are at present the victims of lack of real co-ordination and will continue to be as long as present government policies prevail.

A press release regarding an address delivered by Alfred H. Swayne, vice-president of the National Automobile Chamber of Commerce, before the Traffic Club of New York on March 18 said: "Mr. Swayne pointed out that the motor industry has always favored co-operation rather than unrestricted competition among transportation agencies, and asserted that the railroads could remedy many of the conditions about which they are complaining by a greater

display of initiative in co-ordinating highway and rail service so as to reap economies inherent in both agencies of transportation." The policies that actually have been followed by the motor industry and the railroad industry, and propaganda that appears in other parts of Mr. Swayne's press release, do not support the statements made by him in the sentence we have quoted from his address. The motor industry has promoted unrestricted competition by helping on a vast scale to finance the purchase of motor buses and trucks for long haul competition with the railways.

Evading the Real Issue

Mr. Swayne evaded and confused the real issue as to whether motor buses and trucks should pay for the use of the highways in proportion to the highway damage and costs that they cause, and as to whether they are doing so, by giving statistics regarding the taxes paid upon all motor vehicles, which have no bearing upon the real issue. He asserted that the highways "would have been built if no trucks and buses were in existence," thus completely ignoring the fact that the existence and use of buses and large trucks make it necessary to build highways from two to five times as strong as would be required for private automobiles.

His condescending assertion that the railroads have not shown enough "initiative in co-ordinating highway and rail service" would have been more illuminating if he had said what he meant by "co-ordinating highway and rail service." The *Railway Age* has been for years one of the strongest and most persistent advocates of "co-ordinating highway and rail service," and has long advocated the widespread use by the railways of buses and trucks as substitutes for unprofitable passenger and freight trains, and as means of extending and improving railway service in terminals and elsewhere. If, however, co-ordination is to be in the interest of both the railways and the public it must be economically sound; and we think criticism of the railways for showing lack of initiative in promoting co-ordination comes with very poor grace from those who have devoted themselves, and are still devoting themselves, largely to promoting, not economically sound co-ordination, but economically unsound and destructive competition.

It is essential to the solution of the country's transportation problem that there shall be real co-ordination between different means of transportation. Without it wastes due to over-development of means of transportation, which already are huge, will become more and more enormous. True co-ordination can be secured, however, only by each class of carriers taking its economic place in our entire system of transportation, and this will never be done as long as government policies continue, by subsidies and unequal regulation, to stimulate the growth of the traffic handled by other means of transportation, and thereby to prevent the normal growth of traffic by rail.

Western Railroads Plan Store-Door Service

Two plans to establish store-door collection and delivery service for l.c.l. freight have been announced by middle western and southwestern railways during the last few days. They are of especial significance in that they represent an important departure from past practice by railroads acting as a group rather than individually. They are similar in most respects but different in one major respect.

On the one hand, 11 southwestern roads propose to offer store-door collection and delivery service along their lines in Missouri, Kansas, Oklahoma, Arkansas, Texas and Louisiana. On the other hand, the Chicago & North Western and the Chicago, Milwaukee, St. Paul & Pacific propose to establish similar service at designated points in Illinois, Wisconsin and Minnesota. From an operating standpoint, the plans of all these roads are identical. They propose to issue their own bills of lading—not adopting the expedient of a subsidiary transportation company as some roads pioneering in store-door delivery have done—these bills of lading covering the movement of freight by truck from the door of the shipper to the railroad station, by train to destination, and by truck again to the door of the consignee. The roads propose to arrange for the trucking service through contracts with trucking organizations already in existence in the localities where the store-door collection and delivery service will go into effect.

The major difference between the two plans lies in the fact that the Milwaukee and the North Western propose to charge for the extra service, while the southwestern lines propose to offer it free for the most part. The Milwaukee and the North Western will add to their ordinary l.c.l. freight rates amounts equal to the actual cost of the drayage service performed for shippers and consignees who elect to avail themselves of the additional service. The southwestern lines will give pick-up and delivery service as well as the line haul at no advance over the l.c.l. rates in effect for transportation from station to station, the only exception being that a small service charge will be made in the case of shipments moving for distances in excess of 300 miles.

The importance of these plans is obvious. Truck competition has succeeded in taking from the railways a substantial amount of their l.c.l. freight traffic. A half dozen lines, acting individually, have sought to meet this competition by extending their service beyond their railway stations to the doors of shippers and consignees. These operations have been largely experimental, but now comes the adoption of this means of meeting truck competition by all of the principal roads in an extensive territory. It is an interesting point that the announcement of the southwestern roads and of the two northwestern roads should have been made so nearly at the same time, one group pro-

posing store-door delivery at no additional charge and the other proposing to require shippers to pay for the extra service. This has been a hotly contested point in all arguments relative to the rendering of pick-up and delivery service by railroads. Sometime hence it will be interesting to compare the results obtained by these two similar, but in one respect decidedly different, plans of operation.

The Vanishing Railway Passenger

The average inhabitant of the United States took fewer trips by railroad last year than in any previous year for which complete statistics are available. He took only 5.8 trips by rail in 1930, while 40 years before, in 1890, the earliest year for which complete statistics of the Interstate Commerce Commission are available, he took 7.8 trips by rail. He traveled by rail last year only 219 miles, or the smallest distance since 30 years before, in 1900. The number of passengers carried last year was smaller than in 1904, although the population of the country had increased 50 per cent meantime.

The rise, decline and fall of railway passenger business is a remarkable story. In 1897, at the very end of the long depression which began with the panic of 1893, the average inhabitant made 6.8 trips and traveled 170 miles by rail. Up to that time this was the smallest amount of traveling by rail that the average inhabitant had done since statistics of the Interstate Commerce Commission began to be compiled. During the next decade the average inhabitant steadily increased his traveling by rail until in 1907 he made ten trips a year and traveled 317 miles, and all inhabitants in that year gave the railways a passenger business equivalent to carrying 27,700,000,000 passengers one mile.

Between 1907 and 1920 the increase in the total passenger business of the railways was 70 per cent, the country's population having largely increased and the average inhabitant having increased his traveling by rail to almost 12 trips annually and to a total of 445 miles. From 1920 to the present the decline in railway passenger business has been almost continuous. Their total passenger mileage in 1930 was 40 per cent less than in 1920, or back to where it was in 1907; the average number of trips taken by each inhabitant declined within a decade from almost 12 to less than six, or more than 50 per cent; and the average miles traveled by each inhabitant by rail declined from 445 to 219, or more than 50 per cent.

Although total railway passenger business was the smallest in 1930 that it had been for a quarter century, it has been thus far in 1931 much smaller than in 1930. The railways were developed to handle both passengers and freight. As they have lost 40 per cent of their passenger business within the last ten years, it need cause

no surprise that their managers are concerned regarding the inroads being made by waterways and motor trucks upon their freight business.

Division of Grade Separation Costs

One of the most disturbing tendencies to be observed in railway capital expenditures is the marked increase in the volume of appropriations for improvements which do not produce operating economies. Among such improvements, highway grade separation has taken a predominant position. Thus in the article on appropriations for capital expenditures during 1931, which appeared in the *Railway Age* of January 3, page 24, it was estimated that 12 per cent of the total, or about \$100,000,000, would be spent for that purpose. It is safe to say that outlays for like amounts have been made by the railways for a number of years and it is certain that the volume of the expenditures will be as large or larger for years to come.

This outlay on the part of the railways is determined by two factors, namely, the aggregate magnitude of the projects undertaken and the relative proportion of the total expenditure which must be assumed by the railways. As there is little likelihood of any immediate relief through reduction of the volume of grade separation work required, the only opportunity for a reduction of the burden imposed on the railways lies in a more equitable distribution of the cost. That there is some justification for optimism on that score is to be found in the change to be observed in the attitude of the public toward the allocation of costs of such improvements, and in the fact that in some states steps are now being taken to increase the tax on the highway user for the purpose of providing funds for grade separation work.

It is a fact, however, that the present status of the division of grade separation costs is exceedingly chaotic, as was shown in a report on highway grade separation submitted before the recent convention of the National Association of Railroad and Utilities Commissioners by Commissioner McManamy of the Interstate Commerce Commission. In that report it is shown that in eighteen states no general rule or practice of apportionment is observed; in one state the railways pay virtually all the cost; in two they pay 65 per cent; in five, 50 per cent or more; in eleven, substantially 50 per cent; in three, 50 per cent or less; in one, 40 per cent or more; and in three, 33 per cent. Obviously, such a wide disparity in practice cannot be justified by any rule of reason; yet, as has been rather ably contended, there is no justice in the application of a fixed rule that permits of no variation to meet the circumstances of an individual case, for, as is generally recognized, the cost of grade separation should be apportioned on the basis of an equitable distribution of the benefits accruing to the parties involved. But this

leads at once into intangibles, and in those states where no arbitrary apportionment has been set up, the railways have usually endeavored as individuals to obtain the best bargain possible in each case.

In the meantime the user of the highway for hire is being recognized as a more and more formidable competitor of the railways for whom each improvement in the highway route is much more readily capable of monetary evaluation than in the case of the individual who is a casual or occasional user of any given route. Whether it is possible to develop a formula for the determination of such benefits remains to be seen, but it should be worth the effort of the railways presenting a united front.

Box-Car Depreciation

The question of what depreciation rate should be applied to freight cars is one on which there are almost as many opinions as there are railroads. There are several factors which affect the desirability of retiring cars, not all of which bear with equal emphasis on every case. These factors are of two kinds—those which influence the effect of the old versus the new on operating economy and those which influence the ability of the old adequately to serve the shippers. Factors in the first group are the character of the construction of the old cars which affects the cost of maintenance, and the extent to which improvements in construction which increase economy in maintenance or reduce weight are available in new equipment. Factors in the second group are changes in the character of service which require changes in equipment, or, conversely, changes in the character of the equipment better adapting it to render a more popular or more advantageous service to the shippers.

The character of construction generally employed today strongly supports the use of a low depreciation rate. Aside from increases in weight and capacity, the basic designs of freight cars generally built today do not differ essentially from the advanced designs of twenty to thirty years ago when steel construction began to receive general consideration. Many cars between twenty and thirty years old which have been adequately maintained are operating today with maintenance costs which justify their continuance in service. Cars of present design with which they would be replaced would render the shipper no more desirable service than the old ones and, in the case of box cars, many of the older, low-capacity box cars would bear a much better weight relationship to the average load which they are called upon to handle than do the more recently built, high-capacity cars of greater weight.

Under these conditions, then, a reduction in the cost of maintenance in many cases is about all the inducement there is for the retirement of old cars. That this may not be an adequate inducement until the cars have

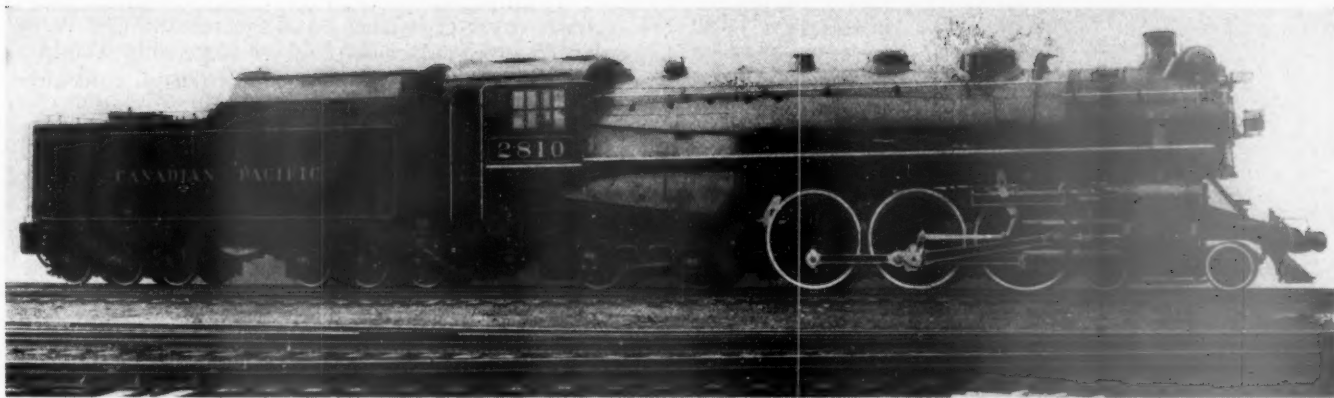
passed well beyond twenty years of age is indicated by the following case in which the records of the total maintenance cost of both new and old box cars are available. The record for a series of twenty-one-year-old cars, which have been out of the shops for about three years and are expected to run three years more before requiring heavy repairs, indicates a total cost of running repairs averaging \$8.10 a month, or \$98.55 annually. It is anticipated that these cars will require about \$600 in general repairs after three more years of service. Assuming, then, that these cars can be kept within an average of about \$100 a year for running repairs and \$100 a year for heavy repairs, with a depreciation charge of \$36 (using four per cent per year on the original cost less 10 per cent salvage), the total annual maintenance charges will average about \$236 for the next four years and \$200 for each succeeding year, or a yearly average of \$218 for an eight-year period.

New cars to replace these old box cars would cost at least twice as much as the old cars cost, thus doubling the annual depreciation charge. The records of a series of new cars which have been in service about one year show total running-repair costs averaging fifteen cents a month. These cars might possibly go through the first eight years of their life until they require shopping with an average expenditure of, say, one dollar a month, or twelve dollars a year for running repairs. To retire the old cars at twenty-one years of age would require a retirement charge of \$144 against the new cars, which, if distributed over the eight years of life of the new car before the first shopping, would average \$18 a year.

The annual maintenance charges, plus the distributed retirement charge, would thus amount to \$102 a year, and the gross saving of the new cars would amount to \$116 per car per year during a period of eight years. If we assume that the old car cost one thousand dollars and the new car two thousand dollars, the gross saving of \$116 is a net return, after interest, of less than six per cent on the additional \$1,000 investment.

There are many cars over twenty years old, the bodies of which have been rebuilt during their lifetime, which will hardly cost \$200 a year for maintenance. Furthermore, it may be doubted whether all new cars may be expected to run eight years for an average cost of repairs as low as \$12 a year. A net return which may be considerably less than six per cent at best, and concerning which there are elements of doubt, is scarcely margin enough to elicit the enthusiastic support of a management, even though the financing may be done through an equipment trust which does not count against the general credit of the railroad.

While this illustration by no means proves that many cars twenty to twenty-five years old should not now be retired, it does indicate that age alone is no criterion of the economic value of freight equipment. Developments in the art, not age alone, are required to make old equipment obsolete.



Canadian Pacific 4-6-4 Type Locomotive Built by the Montreal Locomotive Works, Ltd.

C. P. R. 4-6-4 Type Locomotives Give Good Performance

Smooth running and easy riding qualities feature new power which can be operated at unusually high sustained speeds

THE Canadian Pacific has been operating 10 4-6-4 type locomotives in fast passenger service since November, 1929, which have more than met the expectations of the designers, not only with respect to performance and fuel economy, but also in the matter of speed and smooth riding qualities. The locomotives were duplicated by 10 more of the same design which were delivered the last two months of 1930 and during January, 1931. All 20 locomotives were built by the Montreal Locomotive Works, Ltd., to designs furnished by the mechanical engineering department of the railroad. The first 10 locomotives are designated as class H1a and the second 10 as class H1b.

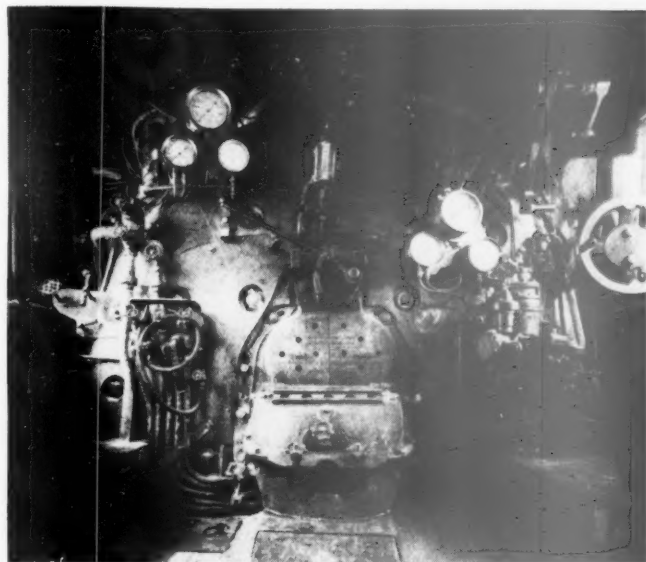
The locomotives were first broken in between Montreal, Que., and Smiths Falls, Ont., on such trains as the "Chicago Express," "The Canadian," the "Royal York," etc. As additional locomotives were received from the builders, the runs were extended to Toronto, Ont. At the present time, these locomotives are being used on extended-run through passenger service between Montreal and Quebec, Que., between Montreal and Chapleau, Ont., and between Fort William, Ont., and Calgary, Alta. The 4-6-4 types, class H1, replaced 4-6-2 types, class G-3, which were described in the December 15, 1923, *Railway Age*, page 1107.

It was not long after the 4-6-4 type locomotives were placed in service that it was found that the schedule time of passenger trains could be reduced, as was contemplated when the locomotives were ordered, and that they could meet the speed requirements of a faster schedule when necessary to overcome delays at terminals or en route. The locomotives have demonstrated the capacity to make up delays on the faster schedule of as high as 15 min. over the division of 128.7 miles between Montreal and Smiths Falls.

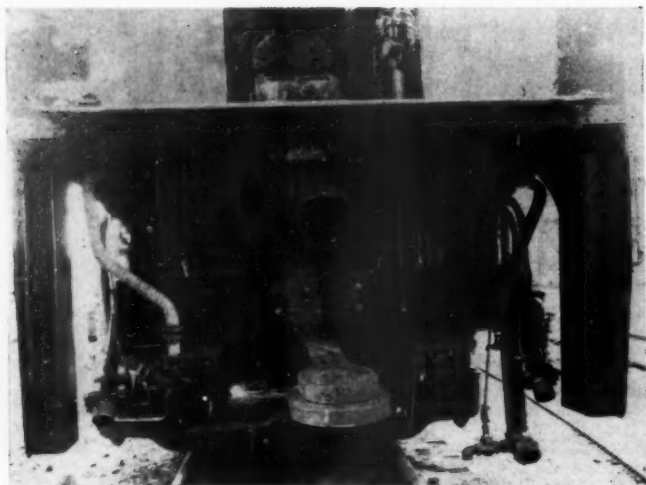
These locomotives are capable of handling trains at extremely high maximum speeds and have demonstrated

their ability to travel at average speeds of from 90 to 95 m.p.h. The smooth and easy-riding qualities make it possible to operate at these speeds without any discomfort to the engine crews.

The cabs are of the railroad's standard vestibule type, entirely enclosed, which is necessary on account of the severe weather conditions encountered in Canada. As shown in one of the illustrations, they are roomy and the gages and valve handles are located for convenient operation. No gage lights are installed. The cab is lighted by a single electric bulb placed in a sheet-metal shade which is attached to the roof of the cab directly above the center of the tender deck. Two holes punched in the shade throw beams of light on the three gages grouped



Interior of the Cab



Tender Connections to the Engine

on the fireman's side and engineman's side, respectively. The light from the two beams is sufficient for observation in the cab and to observe the water in the glass. Electric lights, which can be switched on or off as desired, are located on the wall behind the engineman's and fireman's seats for reading orders.

Designed for Smooth and Easy Operation

These locomotives develop a tractive force of 45,250 lb. The cylinders are of small diameter, 22 in. and have a 30-in. stroke. The driving wheels have a diameter of 75 in. and the boilers operate at a pressure of 275 lb. The total weight of the second order of these locomotives is 350,900 lb. of which 185,000 lb. is carried on the drivers, giving a factor of adhesion of 4.08. They have an evaporative heating surface of 3,861 sq. ft. The firebox is 88 $\frac{7}{8}$ in. wide by 131 $\frac{1}{8}$ in. long, and the grates have an area of 80.8 sq. ft.

There is practically no difference with respect to important dimensions, weights and proportions between the class H1a (No. 2800 to No. 2809, inclusive) and the class H1b (No. 2810 to No. 2819, inclusive), except for a slight increase in weight on the drivers of the latter. The H1a class carries 183,900 lb. on the drivers, as compared to 185,000 lb. for the H1b class.

Type E superheaters are applied which provide a superheating surface of 1,640 sq. ft. Other special equipment includes an Elesco feedwater heater, type CF boiler feed pump, type BK stoker, and American multiple throttle. The connecting rod from the throttle-rigging connection to the throttle lever is placed in the handrail along the right side of the boiler. The throttle lever is easy to operate and can be set to any notch on the quadrant with little effort. No compensating lever is used in the rigging connections from the throttle. The journals of the tender and front engine trucks are equipped with SKF roller bearings.

The engine and tender connections consist of Franklin unit-type laminated safety drawbars and special wedge type radial buffers. The valves are actuated by a Walschaert gear of conventional design. The gear is designed with a short throw of the eccentric and with a long link, and with minimum working angles with the object of securing an easy and smooth-working valve motion. The valves have a diameter of 14 in. with 7-in. travel. The lead is $\frac{1}{4}$ in. with $1\frac{1}{8}$ in. lap and $\frac{1}{4}$ in. exhaust clearance.

The valve gear is so applied that the locomotive cannot be operated at less than 20 per cent cut off. This feature requires intelligent operation of the throttle with

reduced steam pressures for light load. The main drivers are cross-counter balanced and the remaining drivers are balanced to 40 per cent of the reciprocating weights. The engine truck is of Commonwealth design constant-resistance type.

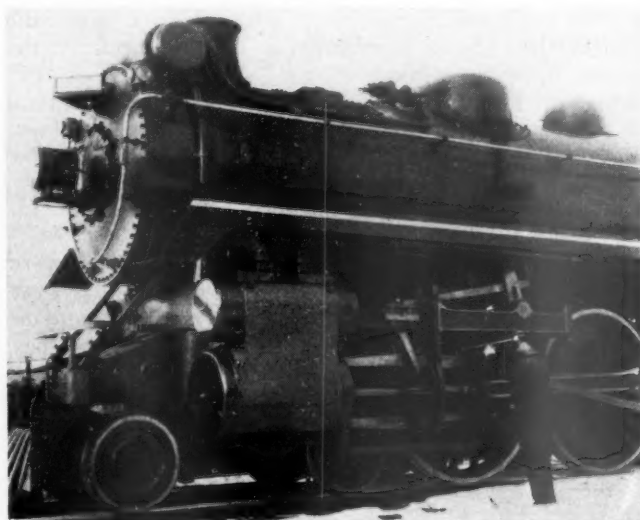
The four features in the design of these locomotives mentioned in the preceding paragraph plus careful study and attention to the design of the running gear and proportioning of parts, are considered to be the important factors contributing to the excellent riding qualities of these locomotives, and enabling them to travel at the high speeds which have been attained.

Performance in Road Service

A study of the performance of these locomotives in road service showed economies in fuel and water, and considerable flexibility with respect to operation. With light trains of around seven cars, the engine crews carry around 250 lb. steam pressure. The locomotives perform satisfactorily at this pressure when hauling trains of light tonnage, and the practice has been found to be economical with respect to fuel and steam consumption. In fact, the engine crews carry a gage pressure varying between 250 lb. and 275 lb. which, according to their judgment, will handle the train the most effectively and the most economically. This practice also eliminates excessive opening of the safety valves, especially on arrival at stations.

A number of trial runs were made between Montreal and Smith Falls on the Winchester subdivision, a distance of 128.7 miles. This subdivision is of rolling profile with a maximum of 0.4 per cent grade. These tests were made with locomotive No. 2800 after it had been in service over 80,000 miles. The tests were conducted without any repairs being made to the locomotive. With a 12-car train, an average of 1,021 tons behind the tender, the locomotive consumed 12,000 lb. of coal and 7,000 Imperial gallons of water. The average coal consumption, east and westbound, was 90 lb. per 1,000 ton-miles and 90 lb. per locomotive-mile. The average steam pressure carried during the round trip was 258 lb. per sq. in. The average feedwater temperature was 218 deg. F. and the average superheat temperature, 625 deg. F.

With a 15-car train, averaging 1,281 tons behind the tender, east and westbound over the same division, the locomotive used 14,200 lb. of coal or 90 lb. per 1,000 ton miles and 112 lb. per locomotive-mile. An average steam pressure of 266 lb. was carried; average feedwater temperature was 214 deg. F. and average superheat tempera-



Front-End View Showing Arrangement of the Valve Gear

ture, 650 deg. F. A total of 7,500 Imperial gallons of water was used.

The same locomotive, hauling a 19-car train, averaging 1,652 tons behind the tender, used 15,500 lb. of coal for the round trip—70 lb. per 1,000 ton-miles and 118 lb. per locomotive-mile—and 8,500 Imperial gal. of water. The average steam pressure carried was 274 lb.; average feed-water temperature, 222 deg. F. and average superheat temperature, 675 deg. F.

A total of 17 trial runs were made, beginning with a 12-car train of 1,021 tons, and increasing the tonnage by adding one car after each two successive runs until the two last runs with 19 cars, averaging 1,652 tons, were made. The steam pressure carried was stepped up gradually from 258 lb. with the increases in tonnage. At the same time the coal used per 1,000 ton miles gradually decreased from 90 lb. to 70 lb.

The first locomotives delivered have made nearly 140,000 miles. Practically no maintenance, except the usual

Principal Dimensions and Weights of the Canadian Pacific 4-6-4 Type Locomotives

Railroad Builders	Canadian Pacific Montreal Locomotive Works, Ltd.
Service	Passenger
Road class	H1
Rated maximum tractive force	45,250 lb.
Weight on drivers ÷ max. tractive force	4.08
Cylinders, diameter and stroke	22 in. by 30 in.
Valve gear, type	Walschaert
Weights in working order:	
On drivers	183,000 lb.
On front truck	62,800 lb.
On trailing truck	103,100 lb.
Total engine	350,900 lb.
Tender	292,000 lb.
Total engine and tender	642,900 lb.
Wheel bases:	
Driving	13 ft. 2 in.
Total engine	39 ft. 6 in.
Total engine and tender	80 ft. 6 1/4 in.
Wheels, diameter outside tires:	
Driving	75 in.
Front truck	33 in.
Trailing truck, front	36 1/4 in.
Trailing truck, rear	45 in.
Boiler:	
Steam pressure	275 lb.
Fuel, kind	Soft coal
Diameter, first ring, outside	80 1/4 in.
Firebox, length and width	131 1/2 in. by 88 3/4 in.
Tubes, number and diameter	62—2 1/4 in.
Flues, number and diameter	171—3 1/2 in.
Length over tube sheets	18 ft. 3 in.
Grate area	80.8 sq. ft.
Heating surfaces:	
Firebox and combustion chamber	313.5 sq. ft.
Arch tubes	38.5 sq. ft.
Tubes and flues	3,509 sq. ft.
Total evaporative	3,861 sq. ft.
Superheating surface	1,640 sq. ft.
Combined evaporative and superheat	5,501 sq. ft.
Tender:	
Water capacity	12,000 gal. Imperial (14,400 gal. U. S.)
Fuel capacity	21 tons.

engine-terminal attention, has been required up to the present time. The wear on main-rod bushings has necessitated renewal about every 50,000 and 60,000 miles, and on side-rod bushings, every 80,000 miles. Two sets of main driving boxes have been taken down for rebor-ing after 110,000 miles service. No other major repairs to running gear, boiler or appliances have been required.

Features of Design and Construction

The Canadian Pacific 4-6-4 type locomotives are of conventional construction in the design of which close attention has been given to details, not only to secure efficient performance but also economical maintenance. The boiler and fireboxes are of nickel-steel construction. The crown sheet of the firebox, owing to the strength of the nickel-steel plates, is applied with two "weak sections," which are designed to fail before any other portion of the firebox fails in case of low water in the boiler. This safety feature localizes the danger should there develop a condition in the boiler which might otherwise cause a serious explosion.

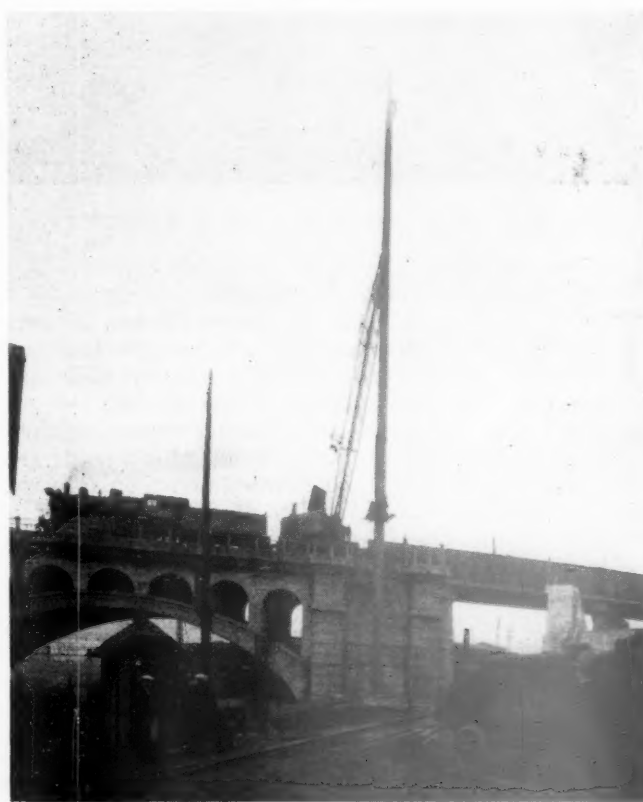
The tubes and flues are electrically welded around the outside of the bead at the tube sheets. This has been standard practice on the Canadian Pacific for the past nine years. The railroad has been getting a general average of 130,000 miles flue service and has had little trouble with leaky flues. Tubes and flues are removed at general repairs, from 18 months to two years.

The grates are of the Rosebud or pin-hole type with an air opening of about 14 per cent. Two baffle or deflector walls have been applied underneath the mud ring, between the underside of the grates and above the ash pan, which extend the entire length of the grates. These baffles deflect the air as it enters the sides of the ash pan downward and then up through the center of the grate area. In addition, the arch tubes are spaced to provide a wide arch-brick span through the center of the firebox and narrow spans at the sides. The wide center arch causes the air and combustion gases to flow toward the center of the firebox and away from the side sheets.

This combined effect of air baffles and the arrangement of arch brick in keeping the cool air away from the side sheets, permits a more uniform temperature, thus practically eliminating warping and cracking of the sheets and leakage of staybolts. With this arrangement the fuel burns more rapidly at the center of the grates than around the sides. The arch tubes are secured at the throat sheet in arch-tube sleeves which permit expansion and contraction without injury to the tubes or sheets. In addition, the firemen are instructed not to allow the fire to die down when drifting or standing so as not to subject the firebox sheets to a wide range of temperature.

In addition to the specialties already mentioned, the cylinders are of Commonwealth cast-steel design integral with the bed casting. The locomotives have screw reverse gears and floating hub liners on the trailing truck.

* * *



Erection of a 170-ft. Steel Pole to Provide for a Power Wire Crossing over the Pennsylvania Tracks at Manayunk, Pa., on the Norristown Electrification

The Santa Fe Installs

Centralized Traffic Control

on 33.7 Miles of Line

Train movements expedited on section of busy single track in wheat growing territory of Western Kansas

By G. K. Thomas

Assistant Signal Engineer, System, Atchison, Topeka & Santa Fe,
Topeka, Kan.



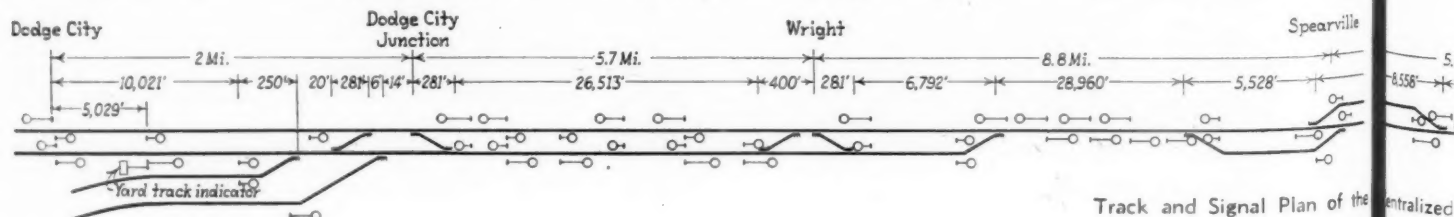
The Dispatcher Handles the Centralized Control Machine and a Train-Order District

THE Atchison, Topeka & Santa Fe has recently completed its first installation of single-track centralized traffic control between Kinsley, Kan., and Dodge City, in the wheat growing belt of Western Kansas. The Santa Fe has a double-track line from Chicago to Hutchinson, Kan., from which point two single-track lines extend to Kinsley and then only one single-track line for 26.7 miles to Wright. West of Wright double track extends to Dodge City, a distance of seven miles, helping to avoid congestion at the entrance of the Dodge City yards. Thus all the traffic on this district converges on the single track between Kinsley and Wright.

The centralized traffic control system extends from

Dodge City to the junction switch of the two main lines just west of Kinsley, a distance of 33.7 miles. At Kinsley, a new low-voltage power interlocking plant, handled by the depot operator, is interconnected with the signal equipment at the junction switch to provide for the routing of trains from Dodge City through Kinsley to either of the single-track main lines to Hutchinson.

The Union Switch & Signal Company's three-wire code system is used, the centralized control machine being operated by the dispatcher at Dodge City who handles also, by train order, the single-track line between Kinsley and Hutchinson via St. John. The Kinsley interlocking was placed in service on October

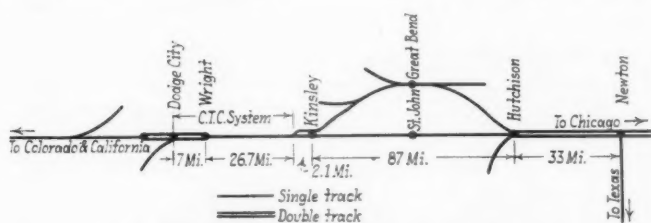


13, 1930, and the centralized traffic control between Kinsley and Wright on December 23, and from Wright to Dodge City on January 29.

Traffic Heavy During Wheat Movement

The territory between Dodge City and Kinsley is situated in the heart of the wheat belt, so that traffic on this line is increased considerably during the rush movement of wheat, which period generally extends from July 1 to August 15. In addition, passenger travel to and from California and Colorado is also heavy during this same period. At the present time, the traffic in both directions on this line includes about 14 passenger and 10 freight trains, or a total of 24 trains, which is about the minimum. This increases later in the year to a maximum during the wheat rush of 24 passenger and 18 freight trains or a total of 42 trains. During the wheat shipping season, many switching movements are made to set out and pick up cars at stations in this territory. A "switcher" goes east from Dodge City each day, picking up from 60 to 70 cars before reaching Kinsley and then proceeding east as a solid train.

It is anticipated that the peak volume of traffic in July and August will require all the time of one dispatcher to handle the centralized traffic control territory and that another dispatcher will be required to handle the single-track line between Kinsley and Hutchinson, on which movements are directed by train



Map Showing Lines Converging to District

order with automatic block signal protection. Ordinarily the dispatcher's table for the train order district is located at right angles to the centralized control machine so that the dispatcher can handle both readily, although during the season when two men will be required, the table will be moved away.

Track Layout and Routing of Trains

The track layout included in the centralized control territory is shown in the diagram. A set of main line reversal crossovers and a double-track connection to the freight yards are located at Dodge City Junction. A passing siding, the end of double track, and a set of crossovers are included in the layout at Wright. In addition to the switches mentioned, those for passing sidings at Spearville, Bellefont and Offerle, as well as the junction switch at Kinsley, are all power-operated. The operation of these switches and, of the signals for directing trains, is controlled from the centralized machine in the dispatcher's office.

A modified absolute permissive block system of traffic control is used on each of the two tracks be-



East End of Dodge City Junction

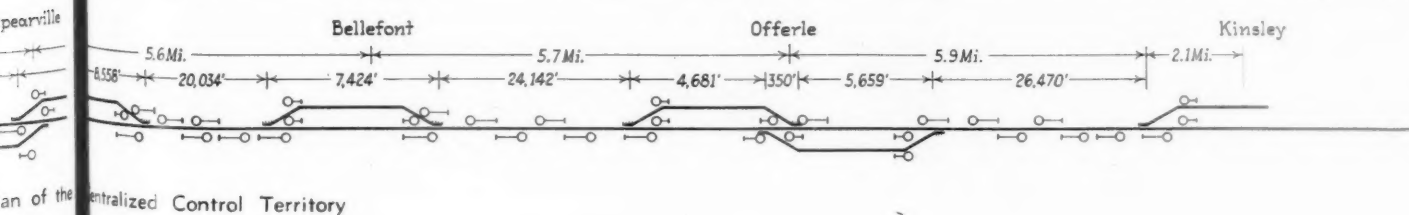
tween Dodge City and Wright, as well as on the single track between Wright and Kinsley. Passenger trains may be moved on either track from Dodge City to Wright and thence on the single track to Kinsley where they may be routed to either of the two lines from there east. If desired, westbound freight trains may be operated against the normal current of traffic from Wright to Dodge City Junction where they enter the yard, so that the westward main track between Wright and Dodge City is left free for passenger trains in either direction. The new method of operation with centralized traffic control made it possible to displace 11 operators formerly required at offices in this territory.

The Control Machine

The track diagram on the centralized traffic control machine in the dispatcher's office is equipped with spotlights to indicate track occupancy of all OS-ing track sections and of outside approach circuits to each group of operated units as well as approach sections at the limits of the centralized control territory. The automatic train graph is equipped with a pen for each OS-ing section, which is a short detector track section between the signal limits at each end of a passing siding or other point where a power-operated switch is used. This graph produces a permanent record of train movements, the sheet being torn off at the end of each 24-hr. period although the roll is long enough for two weeks' operation.

Each switch lever on the control machine is equipped with a green lamp that is illuminated when the switch is normal, and a yellow lamp that is illuminated when the switch is reversed. This distinctive yellow indication is particularly desirable because a glance at the machine indicates immediately that a switch is reversed. The signal levers are equipped with three lights, a red one in the center that is illuminated when the signals are at "Stop," and a green light at each side that shows when the signals are at "Clear" to the right or left as controlled by the three-position lever.

By means of buttons on the machine, the signals may be made "stick" or "non-stick." Usually they are left



an of the Centralized Control Territory

on "stick" control so that a following train movement is not authorized without the dispatcher again coding "signal clear." In case the dispatcher is busy handling train orders on the other district, and has several following train movements in the centralized control territory, he may set his signals on "non-stick" control, which will cause the signals to assume again the proceed indication, when conditions are correct, after a train passes. Thus the use of this feature requires minimum attention to the machine by the dispatcher. One day in January there was a period of six hours in which trains were operated in only one direction, and, by using the "non-stick" feature, five of them were handled during this period without any manipulation on the part of the dispatcher, except drawing lines between the OS marks on the automatic train graphs.

During the month of January, 738 trains were handled in the centralized train control territory, with 15 passing moves and 251 meets, of which 108 were running meets. In other words, 43 per cent of the meets were running meets, which indicates a considerable saving in this respect alone.

General Construction

The signals are of the single-unit, three-color, search-light-type. Dwarf signals are used between tracks when clearance is not sufficient for high signals and where there is a good view along straight level track. This method of construction eliminates bridges or cantilevers and has proved satisfactory when search-light signals are used. The 8-volt lamp bulb in each signal is equipped with 2 filaments in multiple, the main 13-watt filament being designed for a life of 3,100 hr., while the secondary 3.5-watt filament has a life of about 50,000 hr., thus protecting against complete light failures.

The power-operated switch machines are the low-voltage Style-M-20 and operate in 20 sec. on 15 cells of Exide KXHS lead storage battery. These machines are equipped with dual-control for hand operation when making switching moves. At each outlying switch layout a Massey concrete house is provided to house the relays, rectifiers, batteries, field code equipment, etc. These houses are large enough to permit a convenient and accessible arrangement of the apparatus.

A separate pole line for the signal department wires was constructed in this territory. The poles are yellow pine creosoted full-length, a special feature of the line being 20-ft. poles except at crossings, etc., the idea being that a low line is not so liable to be damaged by high winds encountered in this territory. A separate telephone circuit on this pole line connects the dispatcher with all power-operated switches, where a telephone for the use of trainmen is set in the door of the concrete house.

The Yard Track Indicator

As a means of instructing the crew of an arriving train as to which yard track it is to pull in on, a yard-track indicator is located alongside the tracks leading to the yard entrance at Dodge City Junction. This indicator has 10 light units located above the letter "S" for the south yard and the same number of units above the letter "N" for the tracks in the north yard. The indicator is placed on a high mast so that an engineman approaching on the south track can see over a train occupying the north track.

Two semaphore-type tower indicators, for the purpose of announcing the approach of freight trains, are located in the yard master's office at Dodge City. When

the indicators announce the approach of a train, the yard master uses the dial-type switch to dial the number of the yard track on which he wants the train to pull in. The corresponding number is then displayed at once in the yard indicator at Dodge City Junction. The equipment used for the control of this yard indicator is the coder type, similar to that used for the centralized control.

Accidents Investigated in May

THE Bureau of Safety Interstate Commerce Commission, investigated in the month of May, six collisions and four derailments, the derailments including one caused by an automobile stalled on a crossing. Following are abstracts of these reports:

Florida East Coast, Bunnell, Fla., May 3, 6:13 a. m.—A southbound freight train, moving at good speed, collided with northbound mixed train No. 46 while the latter was moving at 25 miles an hour or faster, and one passenger was killed; eight passengers, six employees and three other persons were injured. The mixed train, consisting of a locomotive, two coaches, a baggage and a mail car, was moving backward; that is to say, the cars were being pushed; and the leading car, a coach, was demolished. Much other damage was done, five freight cars in the southbound train being destroyed. The freight, an extra, had encroached on the time of the northbound train, the engineman having been misled by the stopping of his watch and the conductor and a brakeman having overlooked the northbound train. The engineman admitted, however, that he knew that he was violating the rule to clear No. 46 ten minutes. His watch, when examined, disclosed in the works small pieces of glass and a piece of metal which may have caused it to stop, but the evidence concerning its behavior was confused and doubtful. The testimony of brakemen as to what they knew, or what they said to each other, concerning their right against No. 46 was conflicting, while there is no explanation of how the conductor and the flagman overlooked No. 46. Had any one member of the crew properly performed his duty, says the report, the collision would not have occurred. It appeared that train No. 46 had for over a year been run from Bunnell to San Mateo Junction, 24 miles, with the engine at the rear, because of lack of facilities at Bunnell for turning engines or trains. Commenting on this, the report says that the construction of a wye (or of a new cross-over which would permit the running of engines around train) would have been a simple remedy for the lack.

Boston & Maine, North Chelmsford, Mass., May 9, 2:45 a. m.—A southbound milk train, on the Southern division, moving at about 15 miles an hour, approaching the junction of the Stony Brook Branch, ran past cautionary and stop automatic signals set against it and collided with a northbound freight, which was crossing the southbound track to enter the branch. The locomotive was overturned and much other damage done; three employees were injured. There was a dense fog at the time and the report holds that the engineman of the milk train did not begin soon enough to brake the train, ap-

(Continued on page 626)

The Engineer Who Aspires to be a Railway Operating Officer

Can be successful only by being observant and by grasping the opportunities which surround him

By G. D. Brooke

Vice-President and General Manager, Chesapeake & Ohio, Richmond, Va.

[In his capacity as president of the American Railway Engineering Association, G. D. Brooke, vice-president and general manager of the Chesapeake & Ohio, took occasion, at the annual convention of that organization at Chicago, on March 10, to discuss the opportunities which are open to the engineer who aspires to become a railway operating officer and the problems which he must meet and solve. Mr. Brooke is himself a railway engineer of broad experience, having risen from the lower ranks of the engineering department to his present position as an operating officer. This portion of his address follows.—EDITOR.]

YOU are all familiar with the great extent to which engineering officers report to and are successfully directed by operating officers who are not engineers or who at least are not generally recognized as such. You are likewise cognizant of the increasing extent to which operating officers are being drawn from the engineering ranks and the success with which they are meeting their problems as operating officers. It is not upon these that I wish to dwell, but rather upon the problems and opportunities of the young engineer who sets himself to the task of gaining such knowledge of and familiarity with operating conditions and practices as to best qualify him for the assumption of positions in the lower operating ranks, and thus place himself in line to take advantage of the larger and more varied opportunities which such a course holds out.

Besides inherent strength of mind and of body, the chief assets of the man who rises through the ranks to official position, are confidence in himself, a knowledge of practical psychology—so often comprehended in the expression, "He understands human nature"—the ability to adapt to his own use the successful methods of others and the power of concentration upon his specific problems.

Self-confidence is instilled by a familiarity with the details of the enterprise to be undertaken, such as is acquired by the youth who starts in at the bottom as a messenger or call boy, and gradually works up through the various steps, of necessity stopping long enough in each to learn it thoroughly, to a supervisory position, such as that of an assistant trainmaster. In such an experience he not only masters the details of his own jobs, but he gains a useful knowledge of operating rules and many other phases of railroad work. He soon picks up the important features of the working agreements with the several brotherhoods.

He gradually absorbs a vocabulary of terms pertaining to locomotives, cars, tracks and signals, and an understanding of their significance. Waybills and bills of lading fall within his purview, he becomes acquainted with the book of operating rules, learns of the rights of trains, or "19" orders, and of positive and permissive blocks. He makes friends and rides around with the yard engine crews, and anon he can put in a fire himself and eventually handle the locomotive. Moreover, he learns to stand off the shifty brakeman who tries to beat the extra list or to lay off a trip to go fishing when men are scarce. He knows how to handle the hardboiled yard foreman who tries to evade verbal instructions transmitted through him from the yardmaster. He humors one man, tries his powers of persuasion upon another, and coldly puts it up to the third to come across or go and see the boss.

He gets the point of view of the men, as well as that of the "company"; learns their methods of thought and their views; and their attitude towards their work, their rights, discipline, brotherhood relations; and many correlated subjects. He also acquires the knack of meeting successfully the wishes of his superior. A conversation between the secretaries to two Federal managers, overheard one day during Federal control, on how to handle their respective bosses would make excellent reading if it could be reproduced. Parenthetically, one of these boys was a trainmaster a few months later.

This is the atmosphere in which the knowledge of human nature is born; this is the experience which begets confidence in one's self, which grows and ripens into fruitful achievement. Now how can the young railway engineer make up for his lack of such experience; how can he gain the knowledge, the self-confidence, the practical intuition with which the grown-up call boy is equipped, and which is necessary if he is to qualify for the lower ranks of operating supervisory positions early enough in life to take advantage of the opportunities which they offer?

Obviously by simply grasping the many opportunities which surround him, he has already formed habits of study which will enable him to master readily the rules, instructions, and other information available in written or printed form. He should read and study everything he can lay his hands upon pertaining to the details of railway operation and to every phase of the activities of his own railway. He should make friends with those who can supply him the information which he lacks, and should ever be ready to



G. D. Brooke

help them by giving, in return, information which they desire and he possesses.

He should cultivate habits of observation. A healthful curiosity will do no harm and the satisfying of it through study and the tactful questioning of friends and associates will be distinctly beneficial. At every opportunity he should sit in on investigations of train accidents, infractions of the rules, and other matters involving discipline, and should lose no opportunity to inform himself as to the methods and practices in dealing with employees' committees. All of this should be done with the idea of qualifying himself for a supervisory job in the operating department. But how will he break into operating work and get the opportunity to show what he can do? That is indeed an important problem.

First of all he should maneuver himself into division maintenance of way work, so as to be in the closest possible contact with actual operations. Then he must make a reputation for himself in the engineering position which he holds. This requires that he be industrious, willing to work long and irregular hours upon occasion; that he be reliable and resourceful, tactful and cheerful, able to get along well with associates and to handle men; that he have good judgment and a reasonable ambition and be willing to assume responsibility. His aim should be to make of himself the best man in the organization for the job which he fills and the best qualified for promotion. He should realize that the greatest usefulness and success as a maintenance engineer can be achieved by sensing and meeting the management's point of view.

Opportunities for Demonstration of Knowledge

Nor will there be lacking opportunities for demonstrating his knowledge of operating matters. Studies for improved facilities which depend for their justification upon savings in train operation form an excellent example. It will be particularly advantageous to develop the ability to write a good report. A neat, well planned report, which sets forth logically, clearly and concisely the essentials of the study, the conclusions and definite recommendations, is not only effective as a means of having meritorious recommendations carried out, but will serve to draw favorable attention to the author. Discussions with the division operating officers of yard plans, station and passing track layouts, signal locations and other features of the railroad which directly affect train movements may be mentioned. The very nature of the railroad organization will offer many occasions for showing his knowledge of operating practices, and of demonstrating his training and fitness to take a part in them when the opportunity is offered.

Having gained his second objective, he will, doubtless, soon have occasion to prove to a circle of perhaps skeptical onlookers that he is not out of place. A few months of going slow, of being sure of himself before undertaking changes in methods should suffice for this. He should be careful to avoid being lead into immature decisions upon interpretations of train rules, current instructions, working agreements and such matters. He will best gain and hold the respect of the men he must supervise by being frank, and if he is uncertain on any question, by saying so and suggesting that the subject requires some consideration and he had best take it under advisement for a few days.

He will find that when it comes to getting things done, his official title means very little; that in the final analysis he must rely upon his own resourcefulness, his courage, and his strength of character, and that the degree of his success will be measured by his own ability. It

will strengthen his position if he will assume full responsibility in requiring that instructions be carried out and in fulfilling the disagreeable duties in connection with discipline. It is an acknowledgment of weakness for an officer to say that the instructions are those of his superior rather than his own. He must learn to say "no" at the proper time and to stick to it.

He must look to those features of operation which have the greatest influence upon cost—the train load, yard switching methods, keeping trains moving on the road. He will find that current operating matters must be handled very promptly—hot off the bat, so to speak. He should not forget his maintenance friends, but assist them with efficient work train service and in the many ways which will make their allotment go further in providing good roadway and track. As he must live with his associates on his own and adjoining divisions, he should cultivate a spirit of co-operative friendliness and avoid antagonism if at all possible.

Having found himself and mastered the details of his position, he will in due time be looking forward to getting ahead. Here he will find applicable the same formula which he relied upon as a maintenance man, and he should make it his purpose, first, to be the best officer of his class and rank; and second the best material for promotion on the railway.

Study Recognized Leaders

Here he should study and adapt to his own use the methods of recognized leaders with whom he has the privilege of coming in contact. He will doubtless observe that some men are born drivers, but most of them, if they will analyze themselves, are better leaders than drivers. Furthermore, the vast majority of men are not averse to being led but resent being driven. He will do well then to consider carefully the methods of the leader rather than of the driver. Such a leader weighs well the nature of his assignments, knows that they are practicable and workable, and in making them, imparts impressions of such implicit confidence in their being carried out that the recipients feel challenged to use their utmost endeavor rather than disappoint him. He encourages freedom of thought and suggestion; he knows how to delegate important duties and authority to others, and to impart a high sense of responsibility to those assuming them. He works out a sound plan, makes sure that it is well and uniformly understood, places adequate checks upon performance and leaves the details in the hands of capable and trusted subordinates.

A most effective device of leadership is that which so suggests possible courses of action that they will be adopted and developed by those who must carry them out as their very own. The successful leader recognizes that he can gain little through pride in the origination of ideas or the authorship of plans. It is results he wants and since the burden of producing these results must fall upon the rank and file of the organization, to the organization belongs the credit for the achievement. He knows the great importance of maintaining a high esprit de corps, that men take pride in being a part of an organization of high standing, and that they glory in upholding its records and its reputation; he recognizes that adequate rest and recreation, comfortable sleeping quarters, healthful surroundings, good working conditions, competent supervision, strict but fair discipline and appropriate recognition of meritorious action and results will bring out the best in the individual and foster such a spirit of team work and pride in the organization that high class performance will be spontaneous. Fortunate indeed is the railway officer who masters the principles, the practice and the spirit of such leadership.

Keeping Abreast of Current Economic Changes *

Marked opportunities for the engineer who will study the vital transitions in commerce and industry

By Ralph Budd

President of the Great Northern

SWIFTLY changing conditions have characterized the progress of transportation, as well as that of every other industry in this rapidly developing country. They afford many striking examples of the importance of possessing every particle of basic data upon which to proceed with engineering projects. They also afford some striking examples of disappointments and failure due to the presence of unknown facts or unavoidable circumstances. All engineering projects must proceed upon certain assumptions which, in turn, should be supported by the most definite and reliable information obtainable. These assumptions must take into consideration many data which by their nature cannot be conclusive, but are the best that can be procured. For example, in the design and construction of certain works, water supply records which must be used have only been kept for a short period of time, reckoned in terms of the long cycles of rainfall and stream flow to which the world is subject. Low water records, like high water records, are only relative and the engineer who is called upon to build structures whose success depends upon minimum stream flow or maximum flood waters is forced to accept the best records and evidence that are available and then to apply his judgment in establishing the basic data from which to proceed. The high degree of success which has attended upon structures of these kinds is the best evidence of the care that has been taken in giving proper weight to all the data that were available. Unprecedented drought, however, may dry up reservoirs behind the most carefully designed dams, with results even more disastrous than failure of the dam itself.

Other uncertainties affecting basic data are in the nature of changing social, industrial, and political conditions which cannot be foreseen or predicted far in advance, but the forerunners of which do show some advance signs and warnings. Examples of such variables may be cited almost without end. Take railway location and construction: The proper economic values to allow for gradients and curvature, as well as the economical standards of track structures to use in building depend upon such things as the volume of traffic, the cost of fuel and other supplies, wages of employees, interest rates, the character and extent of competition, and many other things. Considering the great number of these items, it is easy to understand why some railway lines

have been built which have not fulfilled the expectations of their promoters and it is difficult to understand why so many have succeeded, especially as most of the railways of the United States have been built in advance of settlement or commerce, so that the future volume of traffic necessarily has been subject to estimate, depending upon what, in the judgment of the management or promoters, the territory would produce.

Of course, in general, railways in new territory have been built as single track and sometimes with relatively steep grades and heavy curvature, and later they have been improved. But to illustrate the difficulty of making reliable traffic estimates, take three such staple commodities as coal, wheat and lumber, which together constitute 40 per cent of the total freight traffic of the railways of the United States. With the country fully launched in an industrial era at the time when the railways were built, the proposition that the per capita consumption of these commodities would increase and that the estimated increase in population would be a conservative indication of the probable aggregate growth of traffic from these three commodities would have seemed indisputable. There was every reasonable expectation of a growth in traffic in these commodities in even greater proportion than the increase in population, because of the increasing wealth and purchasing power of the people as a whole. Instead of an increase, however, it is found that the consumption of these three staple commodities has declined during the past ten years, not only per capita, but in the aggregate. The result is that notwithstanding the increase in population, we are now using less coal, less wheat, and less lumber than we were using ten years ago.

Oil, natural gas, the internal combustion engine, hydro-electric development, and the greater efficiency in the use of fuel are responsible chiefly for the decreased use of coal. Substitutes for wood in boxes, inside building finish, roofing, etc., and the magic combination of concrete and steel have supplanted timber for many construction purposes. Most surprising of all, perhaps, is the declining use of wheat flour, in view of the higher standards of living. Perfection of the transportation of perishables and improvements in agriculture and horticulture have resulted in making the table delicacies of every section of our country available in all parts of the country at all times of the year, and the average family has attained such high purchasing power that it can afford these delicacies. In consequence, the consumption of wheat has



Ralph Budd

* Abstracted from an address presented before the Western Society of Engineers and the four Founder societies at Chicago on the occasion of the presentation of the Washington Award for distinguished engineering achievement to Ralph Modjeski, consulting bridge engineer, on February 25, 1931.

been reduced approximately 100,000,000 bushels per year compared with the rate of consumption in 1900, an amount which is substantially comparable to the vexatious surplus of wheat which now gluts the market.

Another type of variable which affects basic data is that which grows out of the advances in the science of structural, mechanical, and electrical engineering and allied activities. These influences have changed the loading of bridges, for example, from trains made up of 25-ton cars and 100-ton locomotives to cars and locomotives of more than double that capacity, and, in the case of highway loading, the volume and density of traffic has multiplied many fold. Newly developed material, such as alloy steel, and perfection and refinement in manufacture, as illustrated in modern cold-drawn bridge wire, have made practicable long spans where they had been considered prohibitive.

Permanent or Semi-permanent

When to build structures in permanent form and when to make them temporary or semi-permanent are nice engineering questions. The increasing weight of motive power and equipment has caused the replacement of more railway structures than have been retired due to age or than have been worn out in service. Greater efficiency of locomotives, enabling them to be operated economically over long distances, has resulted in the abandonment of many complete terminals. Locomotives and cars themselves have become obsolete in design rather than through age.

My observation and experience has been that the determination of many of these questions which are fundamental to the success of projects involving a large amount of engineering service is arrived at in no sense through careful research, but is left to off-hand judgment. Too often these fundamental questions receive comparatively little thought or study from anyone. Engineers often assume a disdain and an attitude of irresponsibility or disinterestedness toward any matters except those which are technical in the narrowest sense. I believe that this tendency to limit the extent of his responsibility has been one of the greatest faults and weaknesses of the engineer. What training could better qualify one to analyze and judge of the probable future trends and, therefore, to establish the soundest assumptions upon which to base right conclusions.

Obsolescence

Perhaps the outstanding characteristic of the progress in all modern industry in the United States has been the constant substitution of improved appliances, machinery, and tools for those which are in use, regardless of how recently the present tools and machinery may have been installed or in how good condition they may be. This characteristic of industry in the United States probably is its most striking difference from that of other countries and may even be said to constitute the keynote of its phenomenal success. Six months ago, in answer to the question, "What impressed you most on the railways of America," a group of Russian railway officials, who had spent three months studying the railways of the United States and Canada, replied: "We were most impressed to see the American railways removing machinery and tools which were in good condition and, at great expense, installing others; also to see them dismantling cars and locomotives which could have been kept in repair and placing in service others which were larger and more modern." This comment could almost equally well have been made by representatives of other countries of the Old World and it could, moreover, have been equally appropriate in reference to other industries. This national

tendency of ours to change the improvements of today for something better tomorrow doubtless has been the cause, or at least an essential accompaniment, of our startling industrial attainments. It may at times be overdone, but it should be recognized as a definite factor and be given due consideration in planning structures for the future.

Of these trends which change the basic data upon which projects are launched and money is spent, some are discernible early and some remain obscure, but the point I wish to emphasize is that the engineer is in a position to know and appraise the importance of these trends as early as anyone and that it should be a part of his business to consider the soundness of the economic assumptions behind new projects as well as the physical foundation upon which he rests his buildings and bridges. I have purposely selected some examples of data difficult or incapable of ascertainment, but only to emphasize the need of the most careful study of these factors which have too often been considered extraneous or beyond the field of pure engineering.

Accidents Investigated in May

(Continued from page 622)

proaching the stop signal. The report says that in view of the density of traffic on this line, serious consideration should be given to the necessity of additional protection. The diagram in the report shows, however, that the junction is properly signalled and nothing is said as to what kind of additional protection is deemed desirable. The Stony Brook branch is operated by a centralized traffic control system.

Yazoo & Mississippi Valley, Harriston, Miss., May 11, 2:15 a. m.—Southbound passenger train No. 15, moving at about 35 miles an hour, was derailed by an obstruction at a highway crossing and the locomotive was overturned. The engineman and fireman were killed and two passengers were injured. A piece of timber and a piece of large terra cotta pipe had been placed on the crossing. Switch lamps had been tampered with recently at places near this crossing but nothing has been learned about the perpetrators of any of the crimes.

Stop-Law Ineffective

Illinois Central, Tangipahoa, La., May 18, 7:35 a. m.—Southbound passenger train No. 7, moving at high speed, was derailed by an automobile stalled on the track at Robb street, near Tangipahoa station, and the locomotive was overturned. The engineman, the fireman and the driver of the automobile were killed and four passengers and two trainmen were injured. The driver of the automobile, a boy of 14 years, appears to have been giving his attention to a piece of ice carried in the back part of his car, and to have driven upon the crossing without looking for trains. He was driving at low speed but there is a law requiring vehicles to be stopped before passing over a track, and there was a post at the approach giving notice of this law. In view of the density of railroad traffic at this point and the restricted vision available to drivers of vehicles; and also because Robb street crossing is used very little, the report says that "it would appear that this crossing could be eliminated and the traffic diverted to Center street, 950 ft. north of Robb street."

Lehigh Valley, Bear Creek Junction, Pa., May 18.—

An eastbound freight train, stopped by an undesired emergency application of the brakes, was run into, after about six minutes, by a following eastbound freight—locomotive, 50 cars and a caboose—moving at 15 or 20 miles an hour; locomotive overturned, caboose wrecked and destroyed by fire and other damage done; three employees injured. The engineman of the colliding train is held responsible for failing to control his speed on a steep descending grade. He had passed a cautionary automatic block signal about two miles back and also a stop signal, and at each of these signals he operated the forestalling device of the automatic train stop. It appears that the pressure-retaining valves had not been carefully attended to and the inspector believes that not enough of them were set in the holding position.

Pennsylvania, Shawmont, Pa., May 19, 6:30 a. m.—A work train backing out of a middle siding was turned to the right so as to foul the main eastbound track instead of to the left, as was intended, and it was run into by eastbound passenger train No. 5920. The locomotive of the passenger train was overturned and its engineman was killed; two passengers, five employees and five other persons were injured. The first switch of the cross-over leading out of the siding was in its normal position, but the men in charge assumed that it had been set the other way. The brakeman who should have seen that it was set right, appears to have been absent from his post and the conductor, who should have seen that the movement was safely made, claims to have given instructions to another brakeman, concerning which instructions there is conflicting testimony. The inspector holds that the conductor, by setting one of the two switches and calling upon a brakeman to attend to the other, gave misleading information to the engineman. The work-train locomotive (at the head of its train) was moving backward and had been standing so close to the switch that the engineman could not see the rails; and there was no switch target.

High Speed on Sharp Curve

Pennsylvania, Mocanaqua, Pa., May 19, 11:41 p. m.—An eastbound excursion passenger train, consisting of locomotive 3011, four coaches and one baggage car, moving at about 40 miles an hour, was derailed on a curve of about seven degrees and the locomotive was overturned. A hotel near the track was damaged and three persons within the building were injured; engineman and fireman killed, 28 passengers and four employees injured. It is believed that the derailment was caused by excessive speed, combined with pieces of stone ballast on the rail. The rate of 40 miles an hour was the maximum allowed for this curve, but the inspector thinks it was exceeded. The track was in good condition but the curvature, which had been rated as 5 deg. 30 min. was found to be greater; and at one point was 7 deg. 45 min. The super-elevation varied from 3.2 in. to 4.8 in., not sufficient for more than 30 miles an hour. The presence of pieces of ballast on the track, which had been crushed, was not explained, though there had been recent complaints of malicious obstruction in this vicinity and in one case the culprits had been found and punished. On the whole, it is held that the rate of speed alone was not sufficient to cause the derailment; but the obstruction on the track was sufficient to destroy the narrow margin of safety which otherwise would have existed. A dozen pages of the report are given up to a study of

the track and the locomotive to discover any possible cause other than the causes named.

St. Louis Southwestern of Texas, Naples, Tex., May 20, 6:38 a. m.—A northbound passenger train of the Texas & Pacific, running as extra 393, collided with a northbound freight train standing at the station, and four passengers, six persons carried under contract, and 10 employees were injured. The conductor and the flagman of the freight are held responsible having failed to protect their train by flag. There was a dense fog at the time and the engineman is blamed for not having sounded the whistle for the flagman to go back. The flagman claimed to have thrown fuses, but none was seen from the passenger train. The engineman of the passenger train is held at fault for not having the train under better control, knowing about the freight and knowing that it might stop there for orders. The dispatchers had extra work to perform, because of tracks obstructed by high water and the presence of trains from the Texas & Pacific. If the passenger train had been run on a schedule instead of as an extra, the freight then would have been obliged to clear the time of the passenger ten minutes; and then probably would not have left Mount Pleasant ahead of the passenger train. For a period of 30 days prior to this collision there had been nine trains each way over this line which, says the report, "is sufficient to justify the use of a suitable form of block system."

Chicago, Rock Island & Pacific, Beckett, Okla., May 27, 8:40 p. m.—Westbound freight train No. 93, running at excessive speed within yard limits, entered a passing track and collided with a locomotive; engineman, fireman and one brakeman injured. The engineman of No. 93, held responsible for the collision, averred that the fireman and the head brakeman had misled him by calling "all clear" when they were approaching Beckett, some distance away. It appears that these men and also the engineman himself had mistaken the green light of a marker, on the caboose of a train which was in the yard, as the clear indication of the switch lamp at the entrance to the passing track. This lamp actually showed red, but the engineman said that he did not see it. The weather was favorable and the engineman, says the report, had no excuse for not observing conditions ahead and keeping his train under control.

Grand Trunk, Belsay, Mich., May 28, 2:20 p. m.—Westbound passenger train No. 17, moving at high speed, ran over a misplaced switch and the engine, tender and first car were overturned. The engineman and fireman were killed and nine passengers and four employees were injured. The switch that was in the wrong position had been last used by a lineman operating a track motor car with two trailers. The lineman is held responsible and the report says also that neither he nor the laborer, to whom he delegated certain duties, took sufficient precaution to know that the switch was left in proper position and locked. This laborer stated that he had seen that the rails were in the right position before he left; but later, when the government inspectors appeared, he could not be found. This and several other switches at this point have red targets to indicate when they are open but the report recommends that they be arranged so as to be more visible from approaching trains. Automatic signals are being introduced on this road and would soon have been installed at Belsay. The laborer at fault had been in the service three years but later was out of service and had been re-employed only one week before the occurrence of this derailment.

N.Y.C. Reciprocity Testimony Concluded

EXAMINATION of New York Central witnesses was concluded on March 19 at the final Brooklyn (N. Y.) session of the hearings in connection with the Interstate Commerce Commission's investigation into reciprocity in purchasing and routing. At the close of this session Examiner Rogers adjourned the hearings to such time and place as will later be announced.

Closing testimony was in response to questioning on the correspondence taken from New York Central files and introduced as I.C.C. exhibits. While most of the letters and memoranda were such as to require no explanation, several others contained passages which the witnesses were asked to expound and interpret.

R. J. Menzies, traffic manager, was first questioned; he was followed in turn by W. C. Bower, vice-president in charge of purchases and stores, and C. S. White, purchasing agent. Toward the close of his testimony the latter admitted that, aside from lumber purchases, perhaps about 75 per cent of New York Central orders for materials and supplies, price and quality being equal, are influenced by traffic considerations.

Allocation of Cement Orders

Mr. Menzies was examined on the correspondence relating to cement orders, the procedure in connection with allocation of which was outlined in an examiner's note, published in the *Railway Age* of March 21, page 592. The allocation system, the witness explained, was adopted as a protective measure it had become difficult to satisfy the requests of cement companies for orders on specific work. The plan was installed January 1, 1926, in an endeavor to bring relief from criticisms of those firms who felt that they were not getting their share of orders.

Mr. Menzies stated that he goes no further than to recommend to the chief engineer that the latter request contractors doing New York Central work to make a certain allocation of cement orders. The record of cement allocations is conducted on a debit and credit system. If the recommendations are not followed by the contractor the credit is transferred from the company to whom the allotment was assigned to the firm which received the order. The Walsh Construction Company of Syracuse, which Mr. Menzies said gets a good share of New York Central construction work, especially big work, assumes the right to control the buying of cement on contracts which they receive. Asked how this company "gets away with" this attitude, the witness said that they seem to be able to bid lower. He did not object to the Walsh attitude and when cement orders of this contractor are placed the companies favored are credited in New York Central records.

Examiner Rogers was interested in the effect of the allocation system on the price which the New York Central pays for construction work: Whether if a long haul were required on a cement allocation the freight rate paid to the New York Central would not be neutralized by a charge by the contractor of this freight rate against the construction job. The witness thought that the contractor considered this element in submitting bids; the New York Central has never been called upon to reimburse contractors for freight rates

paid on cement. Every endeavor, he continued, is made to be fair in the allocations so that contractors will not be penalized because of a long-haul on the cement they are requested to buy; business is divided with a "reasonable haul" in mind. If off-line cement is purchased a routing which will give the longest possible haul to the New York Central is sought.

In closing Mr. Menzies reiterated his previous testimony that he had no conferences on draft gear purchases. His attention was called to a diversion from the New York Central to the Erie of some Swift & Co. livestock traffic. He explained that business of this concern is divided and that when the diversion was made the assignment of traffic between the two roads was equalized by the New York Central's getting more of Swift & Co.'s packing house products traffic. Thus the ratio remained the same but he did not know the reason for the reassignment.

This witness also stated that no credit is taken for steel purchased by contractors doing New York Central construction work. Finally, Mr. Menzies denied recommending passes for officers of small lumber roads; lots of requests come from short lines, he said, but he was unable to identify them as lumber roads.

Fuel Order Allocations Further Explained

Mr. Bower's testimony was concerned in the main with a further explanation of the allocation plan for fuel coal purchases. It was brought out that the commercial coal traffic of operators is not reported on the statement prepared by the auditor of freight accounts and described in previous testimony. The traffic department makes a report to the purchasing department of commercial coal traffic in each producing district.

In connection with the allocations, the witness explained that fuel orders to each mine are based on the percentage which its commercial traffic bears to the total commercial traffic of the district in which the mine is located; brokers and sales agents are not considered in this distribution which, it is felt, is fair to producers. Because in each district there are certain mines which do not produce suitable coal or are too small to enter the allocation scheme, there remains a certain amount of free coal. This latter represents about nine per cent of the New York Central fuel requirements and the traffic department is permitted to recommend its allocation among brokers, sales agents, etc.

In his examination on coal prices Mr. Bower said that prior to April, 1930, when the Big Four was operated as an entirely separate railroad, some operators quoted higher prices on coal for this line than for the same coal for the New York Central and Michigan Central, taking advantage of the less favorable location of the Big Four with reference to competing producing districts.

Examiner Roberts requested that an exhibit be filed to show the progress of liquidation of stored coal and to determine whether there was stored coal on the Big Four when this price differential was insisted upon by operators. Also, in connection with prices, Mr. Bower stated that much of the period to which the correspondence relates was marked by disturbances in the coal trade and thus the situation as to price and supply often had to be appraised from day to day.

No Orders Because of Threats

Mr. Bower knew of no cases where threats of diversion (such as those appearing in letters abstracted in

last week's *Railway Age*) have actually been carried out. No fuel orders are allocated on the basis of promised traffic, he said, and if a diversion were made the New York Central would take the position that no order would be placed until the traffic was returned. Conflicting claims of sellers as to which controls certain commercial coal traffic are referred to the traffic department for settlement. Traffic reports from shippers are not insisted upon.

Mr. Bower further testified that the New York Central would not buy the output of a mine except under strike conditions; this is because of the effect of such a policy on other operators. Also, a low price from a small mine would be ignored in order not to disturb the allotments.

Lumber Buying

The examination of Mr. White, the final witness, was concerned mainly with the correspondence in connection with lumber purchasing. He explained passages in several letters and reiterated his previous testimony that lumber purchases are influenced less than any others by traffic conditions.

Any lumber firm, he said, which is financially responsible is placed on the inquiry list. Traffic reports from lumber dealers are not solicited although they were always acknowledged. Finally, Mr. White said he had never recommended passes over the New York Central for joint officials of short line lumber roads and lumber companies.

years as did all commodity classifications except coal. Miscellaneous freight showed a reduction of 88,998 cars as compared with last year. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading			
Week Ended Saturday, March 14, 1931			
Districts	1931	1930	1929
Eastern	170,520	198,388	226,886
Allegheny	144,466	179,515	199,100
Pocahontas	45,261	47,442	54,983
Southern	121,473	142,657	149,692
Northwestern	85,700	109,215	112,358
Central Western	105,360	128,260	135,801
Southwestern	61,482	75,831	79,781
Total Western Districts	252,542	313,306	327,940
Total All Roads	734,262	881,308	958,601
Commodities			
Grain and Grain Products	36,239	39,252	43,237
Live Stock	20,026	23,864	22,529
Coal	140,491	130,141	157,681
Coke	8,598	9,689	13,278
Forest Products	34,814	60,222	66,605
Ore	5,875	8,977	11,925
Mdse. L.C.L.	220,325	252,271	260,959
Miscellaneous	267,894	356,892	382,387
March 14, 1931	734,262	881,308	958,601
March 7, 1931	723,534	873,716	947,539
February 28, 1931	682,000	899,498	978,201
February 21, 1931	713,938	827,560	905,503
February 14, 1931	720,689	893,140	957,498
Cumulative total, 11 weeks	7,784,018	9,508,475	10,221,932

The freight car surplus for the first week in March averaged 642,997 cars, a decrease of 7,967 cars as compared with the week before. The total included 312,636 box cars, 258,234 coal cars, 32,045 stock cars and 14,604 refrigerator cars.

Car Loading in Canada

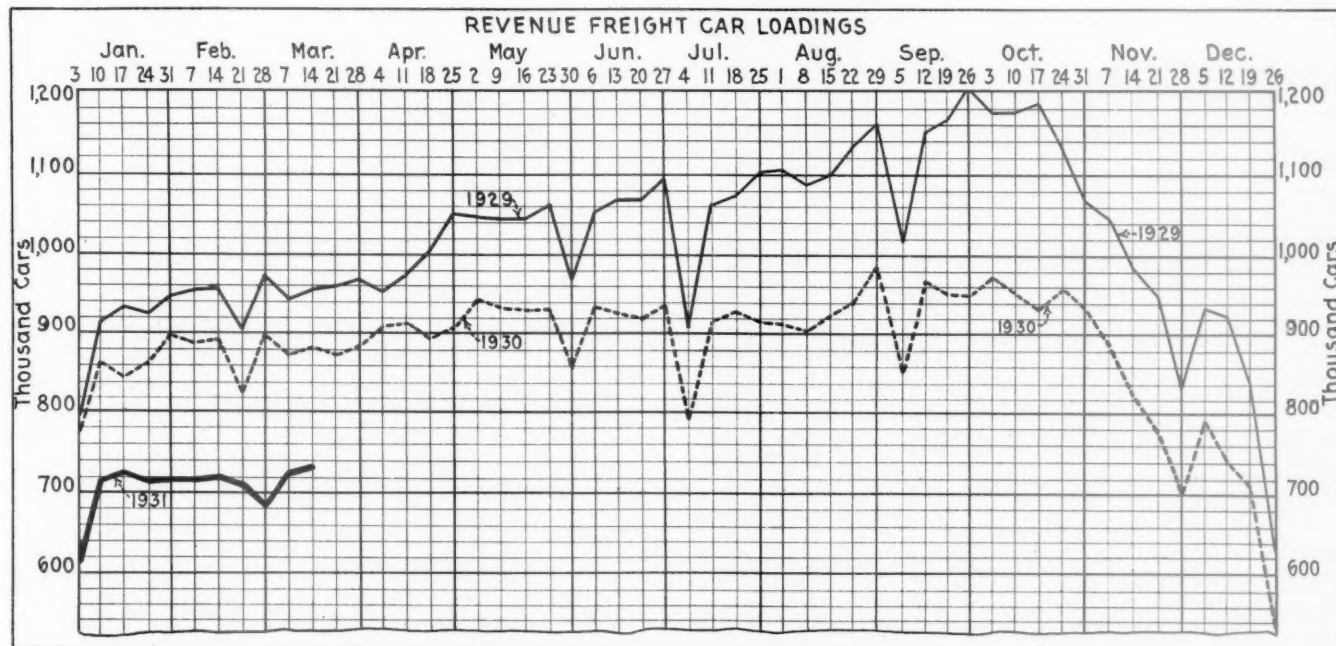
Revenue car loadings at stations in Canada for the week ended March 14 totaled 48,245 cars, an increase over the previous week of 139 cars but a decrease from the same week last year of 12,160 cars.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
March 14, 1931	48,245	29,049
March 7, 1931	48,106	29,338
February 28, 1931	47,759	28,174
March 15, 1930	60,405	38,440
Cumulative Totals for Canada		
March 14, 1931	508,746	304,970
March 15, 1930	623,544	405,103
March 16, 1929	677,458	469,292

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended March 14 amounted to 734,262 cars, an increase of about 10,000 cars as compared with the week before, while coal loading showed an increase of 10,350 cars. As compared with the corresponding week of last year the total was a decrease of 147,046 cars and as compared with 1929 it was a decrease of 224,339 cars. All districts showed reductions as compared with both



The N. & W. in 1930

THE year 1930 was far from the trying period to the Norfolk & Western that it was to many roads. Operating revenues, it is true, declined from \$117,631,752 in 1929 to \$100,530,458 in 1930, the lowest total since 1924. Operating expenses, on the other hand, were reduced from \$66,051,247 in 1929 to \$59,675,725, the lowest they have reached since 1917.

Table I—Comparison of Selected Freight Operating Statistics

	1930	1929	Per cent of change	
			Inc.	Dec.
Mileage operated	2,230	2,230	—	—
Gross ton-miles (thousands)	28,420,266	33,125,629	—	14.2
Net ton-miles (thousands)	14,912,781	17,779,230	—	16.1
Freight train-miles (thousands)	9,230	10,388	—	11.1
Freight locomotive-miles (thousands)	10,830	12,357	—	12.4
Freight car-miles (thousands)	584,600	673,010	—	13.1
Freight train-hours	661,772	759,686	—	12.9
Car-miles per day	37.7	48.3	—	21.9
Net tons per loaded car	44.0	45.2	—	2.6
Per cent loaded to total car-miles	57.9	58.4	—	0.8
Net ton-miles per car day	962	1,276	—	24.6
Freight cars per train	64.3	65.8	—	2.2
Gross tons per train	3,079	3,189	—	3.5
Net tons per train	1,616	1,711	—	5.6
Train speed, miles per train hr.	13.9	13.7	1.5	—
Gross ton-miles per train-hour	42,946	43,604	—	1.5
Net ton-miles per train-hour	22,535	23,403	—	3.7
Lb. coal per 1,000 gross ton-miles	117	121	—	3.3
Loco. miles per loco. day	59.6	65.3	—	8.7
Per cent freight locos. unserviceable	8.8	10.2	—	13.7
Per cent freight cars unserviceable	1.0	1.1	—	9.0

Earnings per share of common stock averaged \$21.97, as compared with \$29.08 in 1929 and \$25.71 in 1926, the only years in which 1930's per share earnings were exceeded. After the payment of dividends of \$12 per

rose from 56.15 in 1929 to 59.36 in 1930 and the transportation ratio from 22.02 to 24.17—the 1930 performance being still, in spite of unfavorable conditions, a highly creditable record.

Taxes totaled \$9,850,000—a decrease of \$450,000 from 1929, accounted for by a decline of \$1,050,000 in federal taxes, due to lower income, which was largely offset by an increase of \$600,000 (11 per cent) in state and local taxes. The company's tax payments in 1930 were 108.3 per cent greater than in 1921.

Selected freight service operating statistics are shown in Table I, comparing 1930 performance with that of 1929. It will be noted that train-miles, locomotive-miles, car-miles and train-hours were reduced almost in parallel with the decline in gross ton-miles, and that other decreases in the various figures are those always associated with the reduced utilization of equipment which inevitably follows a traffic decline. Train speed showed some improvement, as did fuel efficiency, and the ratio of unserviceable to total equipment was materially reduced in the face of decreased maintenance expenses.

Operating and traffic results for the past eight years are shown in Table II which presents in detail the great growth of this company in that period. The growth has been not only in gross revenues—which, after all, in 1930 were the lowest since 1924—but, in even more marked fashion, in operating efficiency. For example, in 1925 when operating revenues were almost \$5,000,000 greater than in 1930, nevertheless, in that year net income was some \$4,000,000 less than in the year just past. The N. & W. offers an outstanding example of the efficiency of the railroad in the handling of

Table II—Norfolk & Western Operating Results, Selected Items

	1923	1924	1925	1926	1927	1928	1929	1930
Average mileage operated	2,238	2,241	2,241	2,241	2,241	2,240	2,240	2,230
Total operating revenues \$	95,591,682	97,707,310	105,218,991	120,409,038	110,948,200	106,947,111	117,631,752	100,530,458
Total operating expenses \$	72,598,871	69,875,109	67,934,815	71,226,914	69,696,125	66,521,695	66,051,247	59,675,725
Net operating revenues \$	22,992,811	27,832,202	37,284,175	49,182,124	41,252,075	40,425,415	51,580,504	40,854,732
Railway tax accruals \$	6,225,000	7,400,000	8,600,000	11,075,000	10,300,000	9,200,000	10,300,000	9,850,000
Railway operating income \$	16,741,639	20,418,662	28,655,153	38,094,793	30,938,334	31,218,144	41,246,346	31,004,732
Hire of freight cars—Cr. Bal. \$	3,003,995	1,726,291	2,386,617	2,418,469	2,690,571	2,866,195	2,840,734	2,840,734
Net railway operating income \$	20,008,866	22,463,369	31,510,952	40,922,151	34,010,950	34,204,057	44,208,196	33,640,858
Gross income \$	23,613,076	23,546,593	32,391,083	42,430,648	36,195,468	36,105,884	47,143,913	36,761,336
Interest on funded debt \$	4,622,613	5,064,022	5,366,857	5,224,780	5,127,620	4,966,918	4,998,828	4,944,570
Net income \$	18,788,497	18,243,348	26,564,759	36,867,506	30,651,295	30,727,043	41,786,461	30,897,073
Preferred dividends (4) \$	919,692	919,692	919,692	919,692	919,692	919,692	919,692	919,692
Common dividends—Rate	8	8	8	10	10	10	12	12
Common dividends—Amount \$	10,304,433	10,563,752	10,890,199	13,883,657	13,985,910	14,017,090	16,874,536	16,877,796
Earnings per share on com. stock	\$13.85	\$12.85	\$18.69	\$25.71	\$21.26	\$21.27	\$29.08	\$21.97
Revenue ton-miles (thousands)	11,161,523	12,130,124	13,683,557	16,719,412	15,024,347	15,015,685	16,730,308	14,912,781
Revenue pass-miles (thousands)	296,044	262,306	235,135	221,809	202,062	168,626	151,546	149,000
Revenue per ton per mile (cents)	0.729	0.699	0.682	0.650	0.666	0.649	0.648	0.666
Total revenue tons	42,574,883	44,425,701	50,266,557	58,188,077	54,846,560	54,053,476	59,712,795	54,053,476
Tons revenue bituminous coal	29,468,395	32,579,530	38,122,834	45,599,980	42,634,250	42,305,396	47,903,916	42,305,396
Per cent bituminous coal of total	69.22	73.33	75.84	78.37	77.73	78.27	80.23	78.27
Transportation ratio	33.54	29.90	26.74	25.15	26.13	24.88	22.02	24.17
Operating ratio	76.05	71.51	64.57	59.15	62.82	62.20	56.15	59.36

share there remained \$14,019,277 for addition to surplus which, at the end of 1930 reached the total of \$201,839,827, or approximately 1½ times the total of common stock outstanding. It is this uncanceled surplus, of course, which accounts for the relatively high return per share of common stock.

The company in 1930 invested \$14,250,387 in additions and betterments—a figure closely approximating the surplus it earned over its dividend requirements. New equipment placed in service included 15 locomotives, 727 box cars, 470 gondola cars and 3,400 hopper cars, an important percentage of which car equipment was manufactured in its own shops.

The decrease in operating expenses was \$6,375,522, including savings of \$3,006,589 in maintenance of way, \$2,044,712 in maintenance of equipment and \$1,600,266 in transportation expenses. The decrease in maintenance of equipment expenses from 1929 was 9.8 per cent; in maintenance of way, 20.3 per cent; and transportation expenses, 6.2 per cent. The operating ratio

heavy bulk traffic moving in quantity, and the possibilities for profitable operation, given such concentration of traffic, at an average freight charge of but little more than 6½ mills per ton-mile.

ISAIAH HALE, safety superintendent of the Atchison, Topeka & Santa Fe System, continuing his comments on the recent safety record among the employees of that system, has issued a bulletin calling attention to the fact that the fatality ratio among employees on duty in the period of 118 days ending March 12, wherein but one employee was killed, was .021 per million man-hours worked. This is exactly 10 times better than the record made for the calendar year 1929, (.021 per million man-hours). In other words, the year 1930 recorded but one fatality where in 1929 there were 10. "Let us rebuild the monument of our now broken record" says Mr. Hale; and he embellishes his circular with a sketch of a monument, the base of which is:

"CONFIDENCE IN OURSELVES"

Motor Transport Section

M-K-T Recovers Lost Freight Traffic

Subsidiary company, offering store-door collection and delivery, wins back traffic lost to competitive trucks

NINE months ago the Missouri-Kansas-Texas organized a subsidiary, the Missouri, Kansas & Texas Transportation Company, to perform store-door pick-up and delivery service for the M-K-T Lines in Texas. Its experience since that time, according to officers of the company, has demonstrated the effectiveness of this agency in helping the railway to meet truck competition for the movement of merchandise in less than carload lots and to win back a considerable amount of traffic which had been lost to the competitive trucks.

According to traffic department estimates, approximately 70 per cent of the transportation company's business is traffic diverted entirely from competitive motor trucks. Approximately 22 per cent is business between Dallas, Tex., and Fort Worth on the north and Houston, Galveston and San Antonio on the south, much of which probably would have been handled by the railroad, even without the transportation company's service, although actual and keen truck competition exists between these points.

Extent of Operations

An indication of the amount of traffic moving via the transportation company is provided in the statistics of business handled during the last four months of 1930. In these four months the transportation company carried shipments as follows:

September, 1930	3,989,131 lb.
October	3,994,034 lb.
November	3,062,866 lb.
December	2,607,102 lb.

Since 1930 was a year of generally declining railroad freight traffic, it is difficult to determine definitely the extent to which the operations of the transportation company have benefitted the railroad in attracting additional traffic. The tonnage handled by the transportation company is, of course, not a true indication, since a greater or less proportion of this might have moved via the railway anyway. Nevertheless, it is interesting to note that the total l.c.l. traffic handled by both the railway and the transportation company during the last three months of 1930, showed a tendency, month by month, to more closely approach the l.c.l. traffic handled by the railway in the last three months of 1929. The decrease in the l.c.l. traffic handled by the transportation company and the railroad in October, 1930, as compared to October, 1929, was 1,853,628 lb. The decrease in November, 1930, as compared with November, 1929, diminished to 1,047,601 lb., while in December, 1930, the decrease as compared with December, 1929, was only 256,674 lb. While other factors undoubtedly had a bearing upon the relationship of traffic handled in 1930 with that handled in 1929, nevertheless, there

seems to be reason to believe that the transportation company has materially aided the railway.

Originally the transportation company offered its services at only 27 of the larger and more important stations on the M-K-T Lines in Texas. Dallas and Fort Worth marked a dividing line in this service between north Texas and South Texas, movement through Dallas and Fort Worth being restricted. In subsequent months, however, supplementary tariffs marked the expansion of the service, until at the first of this year the transportation company's operations covered all of the M-K-T Lines in Texas, with the exception of the Texas Central and Mineola branch. Likewise, the restriction on the movement of freight between points north of Dallas and Fort Worth and points south of those stations has been removed. Extension of the service to other states served by the Missouri-Kansas-Texas Lines has had consideration by the management, but they have not deemed it feasible until such time as motor vehicle transportation has been brought under proper control by these states. Missouri, Kansas and Oklahoma, the other states served by the Katy, do not yet in any effective degree regulate transportation by motor vehicles.

The purpose of the inauguration of the transportation company's service was to co-ordinate railway and motor truck operation in such a manner as to enable the transportation company to furnish shippers with safe, fast, dependable and complete freight service regardless of weather or highway conditions. This purpose has been accomplished. Some collateral benefits have accrued to the railroad on account of the inauguration of this service. Local draymen who take part in the operation automatically become freight solicitors for the railway, supplementing the regular railway solicitation. They make regular daily calls on shippers, with whatever additional calls may be necessary. On the part of the shipper there is appreciation of the fact that his freight is constantly in responsible hands and that its movement is not subject to the hazard of bad roads and inclement weather. Another appreciated feature is the c.o.d. service which is provided at a small additional charge.

Plan of Operation

The plan of operation of the Missouri, Kansas & Texas Transportation Company is similar to that of the Pacific Motor Transport Company, a subsidiary of the Southern Pacific, and of the Texas & Pacific Motor Transport Company, subsidiary of the Texas & Pacific, the operations of both of which have been described in various issues of the *Railway Age*. Under this plan the transportation company does not own and operate any trucks. Instead it contracts with local draymen to perform pick-up and delivery service in the towns served.

using existing facilities instead of multiplying facilities and adding to highway congestion. For the line haul of shipments handled by it, the transportation company contracts with the railway for the handling of the traffic in regularly scheduled merchandise cars. The service is arranged so that freight is picked up at the door of the shipper late in the day and moved by truck to the railroad station, where it is loaded into a merchandise car, moved overnight by train to the point of destination, and delivered early in the morning by motor truck to the door of the consignee.

Under the terms of the contract between the drayman and the transportation company, the drayman agrees to haul to and/or from the freight station of the transportation company in his city all l.c.l. shipments of freight moving under bills of lading and waybills of the transportation company consigned by and/or to consignees within the city. The drayman receives as compensation for the services performed a fixed amount per hundred pounds for all such freight shipments transported by him. This compensation is paid upon receipt of a monthly statement from the drayman, which is audited by the transportation company. The drayman agrees to furnish sufficient and suitable motor truck equipment to handle the traffic, truck movements being made in conformity with direction of the proper officer of the transportation company. He likewise agrees to move shipments promptly and so as to connect with the schedules of merchandise freight cars, and in any event within one and one-half hours after shipments are available to the drayman.

Terms of Contract with Draymen

The drayman also agrees to make collection of all freight charges in accordance with freight or expense bills, which are made up and delivered to him by the freight agent of the transportation company. These collections are remitted daily to the freight agent of the transportation company. The drayman handles the business at his own cost and risk and agrees to assume responsibility for all damages, injuries, and losses to agents and employees of the drayman, or other persons, or for all loss or damage to freight of any character because of delay, rough handling, breakage, etc., from any cause arising while in his possession.

The drayman is also required to furnish a surety bond in an amount satisfactory to the transportation company, as a guaranty of the faithful performance of the con-

tract by him. Either of the parties to the contract may cancel it upon written notice after 30 days have elapsed, and the transportation company may cancel the contract immediately if it desires to do so on account of failure on the part of the drayman satisfactorily to meet the conditions of the contract.

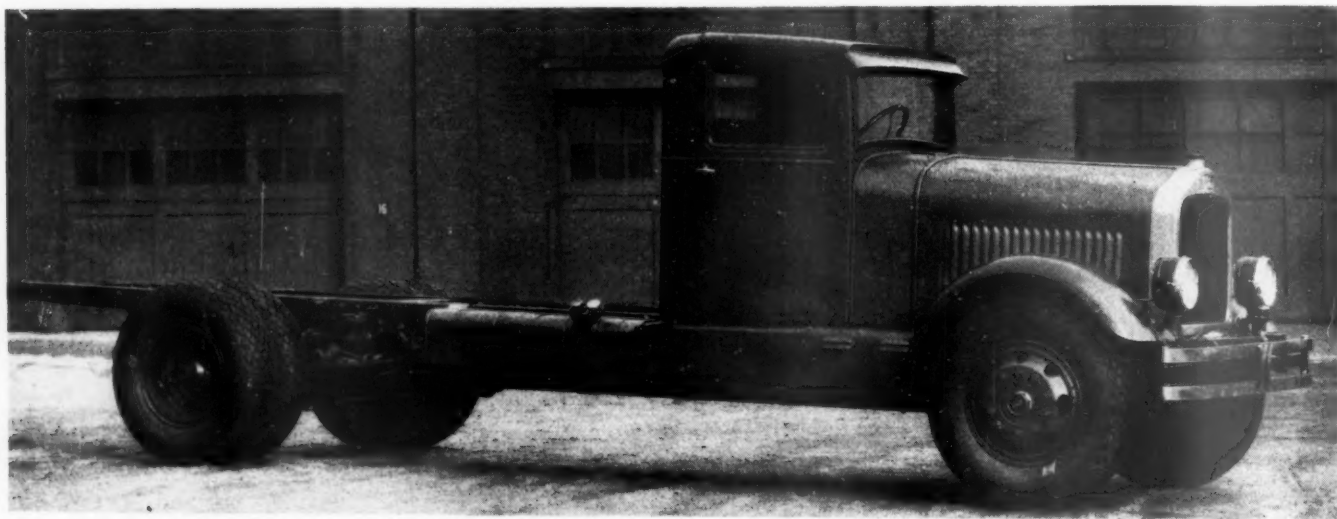
White Company Offers Heavy-Duty Trucks

THREE new series of heavy-duty trucks have been developed and placed on the market by the White Company, Cleveland, Ohio. The new 620 series comprises two models, the 620 with a gross weight of 15,000 lb., and the 621 with a gross weight of 18,000 lb. The new 630 series likewise comprises two models, the 630 and 631, with gross weights of 20,000 lb., and 24,000 lb., respectively. The 640 series provides gross weights of from 20,000 lb. to 32,000 lb. for four-wheel operation, and 40,000 lb. for six-wheel operation.

The engines in the trucks comprising the 620 and 630 series, are of the 6-cylinder, over-head valve type, developing in excess of 75 h.p. The alloy steel crankshaft of this engine has seven main bearings, and direct babbitted connecting rods, drilled for piston pin lubrication, and aluminum pistons of the double-strut type are provided. There are two sets of spark plugs, electrically synchronized, but with each set independent in operation.

In the 640 series, the six-cylinder engine develops in excess of 100 h.p. The engine has a 3-in., seven-bearing crankshaft, synchronized two-spark ignition, and pressure lubrication to the cam shaft, connecting rods, wrist pins, idler gear, air compressor, and accessory-drive bearings. The transmission is mounted as a unit to the engine, the first speeds providing for a ratio of 6.55 to 1.

The wheelbases of the models in the 620 series are 145 in., 157 in., 174 in., and 195 in., the last being offered at extra cost. In the 630 series, the wheelbases are 157 in., 168 in., 188 in., and 215 in., the 215-in. wheelbase being provided at extra cost. In the 640 series, the wheelbases are 157 in., 180 in., 195 in., and 214 in., the last at additional cost. Special wheelbases at extra cost can be furnished for four-wheel and six-wheel chassis.



The White Model 630 Truck Chassis

Pennsylvania Makes Progress in Train-Bus Co-ordination

Combines fully-owned and partly-owned motor coach companies
into Pennsylvania Greyhound Lines, with
8,000 miles of routes

IN the opinion of the management of the Pennsylvania, the co-ordination of the motor coach with the railroad should involve four different types of operation:

1. The replacement by motor coach service of unprofitable train service, in whole or in part.
2. The use of motor coaches to eliminate local stops by trains, thereby speeding up the schedules of the trains.
3. The use of motor coach lines as feeders to the railway.
4. The use of motor coaches to supplement railway service.

Since 1924, substantial progress in the direction of co-ordinated motor coach and train service has been made by the Pennsylvania. In that year it effected its first substitution of motor coach service for unprofitable passenger train service. In January of this year, it was able, by reason of the successive steps it had previously taken in the direction of extended motor coach operation, to consolidate under one name, the Pennsylvania Greyhound Lines, a large group of motor coach operating companies which it either owned outright or in which it held a substantial interest. The Pennsylvania has 10,493 miles of railway lines. The Pennsylvania Greyhound lines comprises 8,000 miles of motor coach routes.

The initial move of the Pennsylvania toward co-ordinated motor coach and train service was the substitution of motor coaches for unprofitable passenger train service. Beginning in 1924, these bus substitutions steadily continued and expanded so that at the end of last year the railway had eliminated approximately 798,561 unprofitable steam train miles per annum. Substantial savings have resulted from these substitutions. In estimating the savings, the company deducts from the

cost of operation of the steam trains eliminated, the cost of the substituted bus operation. On this basis, the estimated annual economy from the substitution of motor coach service for the unprofitable train service was estimated at the end of last year at \$478,240 per year. A subsidiary, the Pennsylvania General Transit Company, was organized to carry on the operation of these substitute motor coaches.

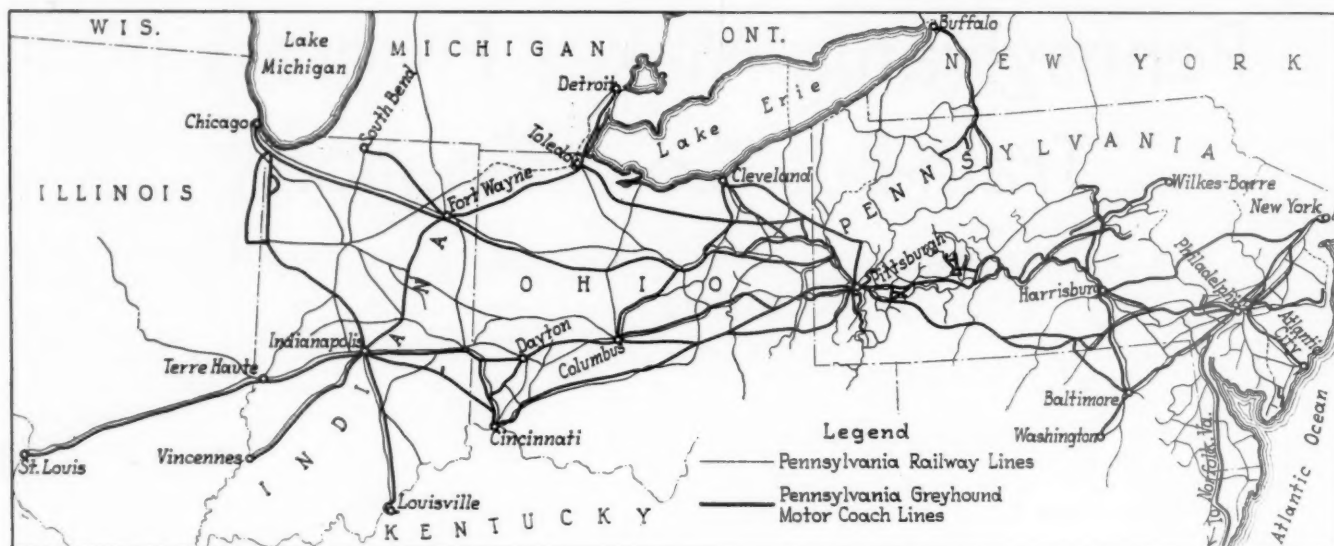
In the process of expanding its motor coach services, the Pennsylvania acquired outright several motor coach lines paralleling the railway, particularly between Philadelphia and New York, and in the suburban area around Philadelphia. By this process of buying existing lines and also by securing certificates of convenience and necessity for intrastate operations by the Pennsylvania General Transit Company, it made steady progress toward the development of a system-wide motor coach service to handle local traffic.

Interest in Greyhound Corporation

At this juncture, according to J. F. Deasy, vice president in charge of the Central region of the Pennsylvania, the railway decided to cooperate with one of the established transcontinental bus lines rather than to attempt the inauguration of additional competing lines paralleling the railway. It therefore acquired 10.7 per cent of the preferred stock and 8.5 per cent of the common stock of the Greyhound Corporation, which was then rapidly expanding in Pennsylvania territory, and which had already built up a substantial and efficiently operated system of long-distance bus lines. The Greyhound Corporation is a central holding company, controlling among other operating organizations the Greyhound

Pennsylvania Greyhound Lines Motor Coach at Terminal Adjacent to Pennsylvania Station in New York





How the Pennsylvania Greyhound Lines Fit Into the Railway System

Management Company, which operates the Greyhound Lines in the East. The purchase of Greyhound Corporation stock involved an investment of \$871,391 in preferred stock, and \$461,802 in common stock, or a total of \$1,333,193.

The acquisition of an interest in the Greyhound Corporation, according to Mr. Deasy, enabled the Pennsylvania to participate to a greater degree in the development of motor coach transportation, and also to develop additional forms of coordination of bus and rail service and to capitalize the advantages of bus service operated in co-ordination with rail service. These involved the use, on behalf of motor coach passengers, of railroad facilities such as stations, ticket agencies, advertising media, etc. There was also the availability of railroad facilities and responsible railroad local agents for employment either customarily or in emergency, as in the case of break-downs, closed highways, storms, and the like.

Pennsylvania Greyhound Lines

In January of this year the diverse motor coach interests of the Pennsylvania were brought together through

the formation, as originally planned, of the Pennsylvania Greyhound Lines, Inc. The American Contract & Trust Company, a subsidiary of the Pennsylvania, holds 50 per cent of Pennsylvania Greyhound Lines, Inc., and the Greyhound Corporation the other 50 per cent. The Pennsylvania Greyhound Lines comprise all of the operations of the Greyhound Lines paralleling the railway lines of the Pennsylvania, as well as the motor coach lines of the People's Rapid Transit Company, the Montgomery Bus Company and the Pennsylvania General Transit Company, all of which were owned by the railway. The only lines operated by the Greyhound Management Company which are not included in the Pennsylvania Greyhound Lines are those portions of the Eastern Greyhound Lines operating east of Buffalo, N. Y., and north of Wilkes-Barre, Pa., and those portions of the Greyhound Lines between Chicago and Toledo, Ohio, and in Michigan, excepting the Detroit-Toledo route, which is included in the Pennsylvania Greyhound set-up.

Among the most heavily traveled routes of the Pennsylvania Greyhound Lines are those lying between Philadelphia and New York, between Philadelphia and Atlan-



Motor Coach in New York-Washington Service on Pennsylvania Greyhound Lines



The New Fruehauf Semi-Trailer Chassis

tic City, N. J., and between Philadelphia and Norfolk, Va. The Montgomery lines are local routes between Sixty-third street and Lancaster avenue, Philadelphia, and Bryn Mawr and Stratford, as well as several other short lines in this vicinity. The Pennsylvania General Transit operations include those from Philadelphia to Brown's Mill and Seaside Park, Philadelphia to Scranton, Pa., and Wilkes-Barre, and Frazier to Phoenix, as well as a number of other short routes.

8,000 Miles of Routes

The Pennsylvania Greyhound Lines, as at present operating, embrace 8,000 miles of highway routes. These extend west to Chicago and St. Louis, south to Louisville, Ky., and Washington, D. C., north to Detroit and Buffalo, and east to New York, Philadelphia, Atlantic City, and Norfolk. The accompanying map indicates how these lines blanket the Pennsylvania railroad system. In the east the motor coach lines parallel the railway lines from New York to Philadelphia, Baltimore, Washington and Harrisburg. Lines radiate also from Philadelphia to Atlantic City and other New Jersey seaside resorts, and from Philadelphia to Norfolk. From Harrisburg lines radiate paralleling railway routes to Wilkes-Barre and a number of branch line points in Pennsylvania.

West of Harrisburg the through routes from the East continue to Pittsburgh. From Pittsburgh there extend a number of local routes, as well as through lines to Cleveland; Toledo and Detroit; Fort Wayne and Chicago; Cincinnati; Columbus, Dayton, Indianapolis, Terre Haute and St. Louis. Other lines extend from Fort Wayne to South Bend, Ind., and from Indianapolis to Vincennes and Louisville.

Financial Results

The motor coach operations in which the Pennsylvania is interested have shown a substantial profit, aside from any economies to the railroad resulting from the substitution of motor coach service for train service. According to Mr. Deasy, in his testimony before the Interstate Commerce Commission, the Pennsylvania Greyhound Lines, for the year 1930, had gross revenues of \$6,725,820.62 and expenses of \$5,869,227.70, leaving a net available for dividends of \$856,592.92.

The company has been working steadily toward the full co-ordination of its railway and highway services. A great deal has been accomplished in various directions, but the management recognizes that there is still much to be achieved.

Pressed Steel Frame in New Fruehauf Semi-Trailer

A NEW semi-trailer with a pressed-steel frame has been placed on the market by the Fruehauf Trailer Company, Detroit, Mich. The model also has other elements of improved design and construction.

The frame is fabricated from pressed steel throughout. On the larger models the side rails have a maximum depth of 12 in. at the point of greatest stress, and taper at both the front and the rear end. The flanges of the side rails are wide to provide extra strength for withstanding severe side thrusts. The flange widths are increased at the rear end of the lower flanges where the spring hangers and radius rods are attached. The auxiliary wheels, or landing gear, have been simplified and strengthened, and all operating parts are contained within the flanges of the frame section. On the heavier models, Westinghouse slack adjusters, for external adjustment of the brakes, are supplied as standard equipment. A new feature in the braking system is the power brake lock, which makes it possible to utilize the full effort of any one of the several power brakes available for trailer use as a parking brake when the trailer is disconnected, as well as serving as a service brake when the unit is in operation.

The new trailers are available in various lengths up to 22 ft. and in capacities up to 15 tons. They are also available with tandem rear axles on either single or dual tire equipment.

THE WESTERN REGION of the Pennsylvania reduced its freight service fuel consumption per 1,000 gross ton miles in January to 145.1 lb., or 7.87 per cent, as compared with 157.5 lb. in January, 1930. In yard switching service, the decrease was 12.32 per cent, while in passenger service it was 8.93 per cent.

THE MISSOURI PACIFIC TRANSPORTATION COMPANY and the Colonial Stages have completed negotiations for the operation of through motor coach schedules to and from points on either system. At St. Louis, Mo., the Colonial Stages will make connections with Missouri Pacific motor coaches for Memphis, Tenn., Houston, Tex., and El Paso, New Orleans, La., and Mexican and Southwestern points, while Missouri Pacific patrons may transfer at St. Louis to Colonial motor coaches for points in the East and the North.

Bus and Truck Operation by Class II and III Railways

THE Interstate Commerce Commission has issued a statistical summary showing the extent of motor bus and truck operation by Class II and Class III steam railways. It is based upon the answers made by these roads to a questionnaire issued by the commission last summer in connection with its Docket No. 23,400, co-ordination of Motor Transportation.

The summary shows that total property investment in motor vehicles by Class II railways, as of June 30, 1930, was \$220,795. The property investment in motor vehicles of Class III railways totaled \$208,203. During the first six months of 1930, Class II railways operated 66 motor buses, for a total of 981,926 bus miles. The number of miles of intrastate routes was 672.19 and the number of miles of interstate routes was 289.41. The number of passengers carried was 474,988 and the

passenger revenue was \$162,733. Class III railways operated 51 motor buses for a total of 692,874 bus miles, covering 470.40 miles of intrastate routes and 259.00 miles of interstate routes. The number of passengers carried was 56,615 and the passenger revenue was \$118,586.

Class II railways operated 18 trucks during the first half of 1930, accumulating 179,456 truck miles, covering 323.21 miles of intrastate routes and 237 miles of interstate routes. A total of 2,943 tons of freight was carried, and the freight revenue was \$46,920. Class III railways operated 20 trucks, for a total of 131,123 truck miles. The number of miles of interstate routes was 572, and there were no intrastate routes, operated during the first six months of 1930. The trucks of the Class III railways carried 609 tons of freight, and had a freight revenue of \$35,806.

In the accompanying tabulations are shown the property investment in motor vehicles of individual roads, and the motor bus and motor truck operating data for 1929 and the first half of 1930, covering the country by districts.

Property Investment in Motor Vehicles Reported by Class II and Class III Railroads

Class II Railways		Property Investment	Class III Railways		Property Investment
Eastern District:			Eastern District:		
East Broad Top		\$7,775	Narragansett Pier		\$41,298
Fonda, Johnstown & Gloversville		80,043	Prattsburgh		1,800
Huntington & Broad Top Mountain		20,134	Tuscarora Valley		1,650
Middletown & Unionville		12,752			
Total		120,704	Total		44,748
Southern District:			Southern District:		
East Tennessee & Western North Carolina		*	Cadiz		2,700
Western District:			Cape Fear		30,000
Copper Range		*	Carrollton & Worthville		850
LaCrosse & Southeastern		1,500	Collins & Glennville		1,052
McCloud River		16,200	Laurinburg & Southern		2,817
Missouri Southern		*	Linville River		*
Pacific Coast		3,069	Louisville and Wadley		4,059
San Joaquin & Eastern		42,106	Ware Shoals		763
Sierra Railway of California		12,216			
Virginia & Truckee		25,000	Total		42,241
Total		100,091	Western District:		
Total United States		220,795	Dardanelle & Russellville		8,564
			Doniphan, Kensett & Searcy		2,380
			Hill City		*
			Manitou & Pike's Peak		*
			Nevada Central		100,254
			Waterville		4,016
			Yreka		6,000
			Total		121,214
			Total United States		208,203

* Not reported.

Motor Bus Operating Data, Class II and Class III Railways, for 1929 and First Half of 1930

	Number of buses		Number of bus miles		Number of miles of Intrastate routes		Number of miles of Interstate routes		Number of passengers carried		Passenger revenue	
	1929	First Half 1930	1929	First Half 1930	1929	First Half 1930	1929	First Half 1930	1929	First Half 1930	1929	First Half 1930
Class II steam railways:												
Eastern district	11	16	165,448	219,365	23.31	116.69	25.37	30.41	232,777	303,892	\$155,627	\$38,872
Southern district	14	16	756,321	395,808	.....	.....	174.00	259.00	.....	.....	86,915	72,676
Western district	20	34	529,215	366,753	481.50	555.50	.....	.....	323,210	171,096	242,542	51,185
United States	45	66	1,450,984	981,926	504.81	672.19	199.37	289.41	555,987	474,988	162,733	162,733
Class III steam railways:												
Eastern district	7	7	162,773	84,922	51.40	51.40	.....	.....	56,618	18,174	39,883	13,332
Southern district	18	20	871,341	452,488	50.00	50.00	174.00	259.00	54,091	25,102	176,745	82,753
Western district	22	24	301,368	155,464	347.00	369.00	.....	.....	32,693	13,339	51,959	22,501
United States	47	51	1,335,482	692,874	448.40	470.40	174.00	259.00	143,402	56,615	268,587	118,586

Motor Truck Operating Data, Class II and Class III Railways, for 1929 and First Half of 1930

	Number of trucks		Number of truck miles		Number of miles of Intrastate routes		Number of miles of Interstate routes		Number of tons		Freight revenue	
	1929	First Half 1930	1929	First Half 1930	1929	First Half 1930	1929	First Half 1930	1929	First Half 1930	1929	First Half 1930
Class II steam railways:												
Eastern district	1	2	10,163	15,845	10.16	24.21	.....	.....	220	1,372	\$1,244	\$4,168
Southern district	6	7	100,720	73,400	.....	.....	63.00	237.00	.....	.....	47,579	27,927
Western district	3	9	55,843	90,211	80.00	299.00	.....	.....	1,150	1,571	11,943	14,825
United States	10	18	166,726	179,456	90.16	323.21	63.00	237.00	1,370	2,943	60,766	46,920
Class III steam railways:												
Eastern district	1	2	14,000	16,000	.....	.....	.....	.....	.....	.....	.....	.....
Southern district	7	8	104,387	79,153	.....	.....	63.00	237.00	11	11	47,699	28,051
Western district	7	10	58,420	35,970	335.00	.....	.....	335.00	569	598	11,455	7,755
United States	15	20	176,807	131,123	335.00	.....	63.00	572.00	580	609	59,154	35,806

Looking Backward . . . New Books . . .

Fifty Years Ago

The Chicago, Milwaukee & St. Paul has awarded a contract for the construction of a line across Iowa, from its present terminus at Marion to Council Bluffs on the Missouri river, about 250 miles. This line will be located between the main lines of the Chicago & North Western and the Chicago, Rock Island & Pacific.—*Railway Age*, March 31, 1881.

The Pennsylvania and the Baltimore & Ohio are again on peaceful terms. The Pennsylvania has agreed to handle freight from the Baltimore & Ohio over the former's lines between Philadelphia and New York. The new arrangement also includes the joint use for the present of the Philadelphia, Wilmington & Baltimore [now part of the Pennsylvania] between Baltimore and Philadelphia, although the Baltimore & Ohio is expected to proceed with the construction of its own line between those points.—*Railway Age*, March 31, 1881.

The Northern Pacific has come under the control of the Oregon Railway & Navigation Company [now the Oregon-Washington Railroad & Navigation Company], or of the chief stockholders of that company, of which Henry Villard is president. The Oregon Company has recently become known as a strong corporation with profitable steamboat lines, commanding all the traffic of the Columbia river above the Willamette by the ownership of short railroads around the two unnavigable rapids, and engaged in constructing a system of short railroads in Eastern Washington and Oregon above the head of navigation. The company has also been engaged in the construction of a main line outlet to this system down the Columbia river to take the place of river steamboats, and provide an outlet to Portland.—*Railroad Gazette*, March 25, 1881.

Twenty-Five Years Ago

A train on the Denver & Rio Grande was released on March 22 after having been snowbound since March 10. The train became stalled after leaving Durango, Colo., and the snow continued to fall until it lay on a level higher than the smokestack of the locomotive. Provisions were carried to the imprisoned passengers by railway employees who climbed the mountain on snow shoes.—*Railway and Engineering Review*, March 31, 1906.

President Roosevelt's regulating crusade has experienced two setbacks this week. While neither relates to railway affairs they are indicative of the manner in which some of his ideas on the regulating the railways may be received by the courts and Congress. Representative Townsend secured a hearing this week before the House committee on interstate commerce on his uniform bill of lading bill. At the close of the hearing W. H. Truesdale, president of the Delaware, Lackawanna & Western, announced that the railways were willing to have some such legislation passed, and hoped that if time were given an agreement on this subject could be reached with the bankers and the shippers.—*Railway Age*, March 30, 1906.

Ten Years Ago

The sale of the Denver & Rio Grande to the Western Pacific for \$5,000,000 on November 20, 1920, was confirmed in the federal court at Denver, Colo., on March 23. The reorganization plans provide for the formation of a new company, the Denver & Rio Grande Western, which will be operated under the direct supervision of the Western Pacific.—*Railway Age*, March 25, 1921.

President Harding has decided to take a hand in trying to find a solution for the difficult railroad situation. Following the cabinet meeting on Tuesday at which the railroad situation and its effect on the business of the country was the principal subject of discussion, the President announced that he would confer with Chairman Clark of the Interstate Commerce Commission and Chairman Barton of the Railroad Labor Board.—*Railway Age*, March 25, 1921.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Study of Inland Waterway Situation, by Samuel S. Wyer. Rainfall, rivers, and river navigation principally considered with the unique features of the Great Lakes summarized. Illustrations and charts. 30 p. Pub. by Fuel-Power-Transportation Educational Foundation, Columbus, Ohio. *Apply*.

Timely Railroad Topics, Nos. 318-373, January 6, 1930-January 26, 1931. Collection of brief discussions of various subjects relating to railways and transportation generally in handy reference form for teachers, editors and reference librarians. Indexed. 116 p. Pub. by Atlantic Coast Line Railroad Company, Wilmington, N. C. *Apply*.

Way Back When—Reminiscences of an Octogenarian, by Slason Thompson. Especially "Glimpses of the Bohemian Club" [San Francisco], Chapter 10, and "Becomes a Railway Publicist," Chapter 20. 358 p. Pub. by A. Kroch, Chicago, Ill. \$2.50.

Periodical Articles

Fresh Fruits and Vegetables from Latin America for the United States, by L. A. Wheeler. "In 1920 imports of fresh fruits and vegetables, excluding bananas, from Latin American countries were valued at around \$1,000,000. In recent years the value of this trade has averaged between six and seven million dollars. Its development... has depended upon improvement in transportation facilities, including the use of refrigeration, without which the movement of these highly perishable products would be impossible..." p. 232 *Bulletin of the Pan American Union*, March, 1931, p. 232-242.

The Georgia Wildcat That Fought the Milk Express. Account of the charge on a locomotive of the Savannah & Statesboro Railroad by a wildcat which the fireman killed. *Literary Digest*, March 14, 1931, p. 38-39.

The Great Ship Canals of the World, by A. J. Grant. History and economic importance of the Panama, Manchester, North Sea, Kiel, Suez, and Welland Canals, the last to be opened in 1931. Address of retiring president at 45th annual meeting, Engineering Institute of Canada. *Engineering Journal (Canada)*, March, 1931, p. 182-190.

Railway Conditions in Australia During 1929-30. Based on reports by E. C. Squire. Discussion of effect of highway and air competition, need of uniform gages, railway consolidation propositions, and status of individual systems. *Commerce Reports*, March 16, 1931, p. 720-722.

Recent Railway Development in Brazil, by Julian S. Duncan. "I have just returned to the United States from a five months' stay in Brazil, where I have been studying the railway systems." p. 253. "I did my traveling either in the locomotive or on the rear platform of the train. One exciting day, at the special invitation of the engineer, I rode the cowcatcher all day..." p. 254. Illustrated. *Bulletin of the Pan American Union*, March, 1931, p. 253-263.

The Skyways of Asia. "The United States, not to be left behind by Europe in establishing air connections with Asia, is planning an extension of its air mail lines which will link the country with Canada then to Alaska and on to Siberia and the Orient across the Behring Strait." p. 19. *Far Eastern Review*, January 1931, p. 19-33 with insert map bet. p. 24 and 25.

Time Stands Still for Food, by Wainwright Evans. Describes, with illustrations, the Birdseye freezing process, with its implications for transportation and utilization of food. *World's Work*, March, 1931, p. 44-49.

Will the Fifth Line Fight, by John T. Flynn. Discussion of consolidation plans in the East. Maps and illustrations. *World's Work*, March, 1931, p. 35-39, with editorial comment p. 20.

Odds and Ends . . .

Railway Man Honored

Col. F. G. Jonah, chief engineer of the St. Louis-San Francisco, has been elected president of the American Society of Military Engineers. He is the second railroad man to be chosen for this honor, the late S. M. Felton, chairman of the board of the Chicago Great Western, having been president of the society in 1929.

An Ace

The Hole-in-One Club on the Missouri-Kansas-Texas is rapidly growing to such proportions as to rival the similar organization on the Southern Pacific. The latest addition to the M-K-T golfers' honor roll is C. J. Werlla, clerk in the office of the superintendent of transportation at Denison, Texas, who performed the feat with a mashie-niblick at a 135-yd. hole.

Simply Terrible

A reader from Erie, Pa., sends in a clipping from the Dispatch-Herald of that city, which describes an accident, and shows the terrible results that may follow an accident—to the linotype machine. The clipping reads as follows:

"No passengers were reported injured or killed, but the L. & N. officials said a careful check would be necessary to determine definitely whether there had been a sapynesnegrrshlu."

Sprunger Wins Downs Prize

A water color painting of the steel mills at Gary, Ind., done by Arthur Sprunger of Goshen, Ind., won the L. A. Downs prize of \$100 offered in the seventh annual exhibit of the Hoosier Salon, recently held in Chicago. This prize is offered annually by the president of the Illinois Central, himself a native Indianan, for the best Hoosier Salon picture of an industrial scene in or near Illinois Central territory, painted by an Indiana artist.

A Helping Hand

During the recent blizzard in the Midwest, there were over a hundred instances of trains making special stops to pick up passengers who were stranded when the motor coaches in which they were riding became stuck in snowdrifts. As an example, one Chicago & Alton train made four extra stops and picked up 56 stranded passengers. The suddenness of the storm caught many motor coach lines unawares, but the railways continued operations without a halt in their schedules.

Engineman Given Medal

Alfred "Rube" Gish, engineman for the Chicago, Rock Island & Pacific at Oklahoma City, Okla., has been awarded a medal for heroic action by President Hoover. At Hydro, Okla., a year or two ago, the passenger train which "Rube" was driving collided with a gasoline truck at a grade crossing, thereby setting fire to the front portion of the train. Although the cab of the engine was in flames, "Rube" stayed at the throttle, and pulled his train a safe distance away from any possible explosion, thus saving the passengers from serious and possibly fatal burns.

A Queer Robbery

The detective force of Mineola, Long Island, together with the railroad police of the Long Island Railroad, find themselves with a knotty problem that would have baffled all the ingenuity of Sherlock Holmes, Philo Vance, and Doctor

Thorndyke combined. A thief entered a crossing watchman's shanty there the other day, and walked out with a red-hot stove, together with the blazing coal that it contained, and vanished as though the earth had swallowed him up. What would you make of that, Watson? Well, as an avid reader of detective stories, may we suggest that the thief was a native of the mysterious island of Naos, where, as any scientist could tell you, children are born with asbestos hands.

Advice to Passengers

The railway centenary celebrations are a reminder that railway travel was once dangerous and very uncomfortable. In "The Iron Road Book and Railway Companion" of 1838, some advice is tendered to passengers:—

"Get as far away from the engine as possible," it says, "for this reason:—First, should an explosion take place, you may happily get off with the loss of an arm or a leg; whereas, if you should happen to be placed near the said piece of hot machinery and an unfortunate accident occur, you would very probably be 'smashed to smithereens,' as brother Jonathan most expressively terms the likely result of such an occurrence. Secondly, the vibration is very much diminished the farther you get away from engine. Thirdly, always sit (if you can get a seat) with your back towards the engine, against the boarded part of the wagon; by this plan you will avoid being chilled by a cold circuit of air which passes through these open wagons, and also save yourself from being nearly blinded by the small cinders which escape through the funnel."—The Irish Times.

The Pocahontas Division

BLUEFIELD, W. VA.

TO THE EDITOR:

Probably your "Odds and Ends" would be interested to know that the Pocahontas division of the Norfolk & Western can boast of the following names which are pronounced similarly:

Conductors	Enginemen
Vawter	Laughter
Foltz	Woltz
Bone	Stone
Tanner	Danner, also Banner
Ball	Hall
Heck	Peck
Neal	Steele
Lowder	Crowder
Helton	Shelton
Bailey	Dailey
Meade	Snead
Baker	Akers

It will also be interesting to note that the following are no relation, although their names are spelled the same:

Conductors	Enginemen
M. C. Douthat	A. F. Douthat
J. E. Lyons	T. H. Lyons
W. H. Spangler	W. H. Spangler

We also have the following brothers:

Conductors	Enginemen
E. W. Francisco	J. S. Francisco
F. A. Francisco	A. E. Francisco
A. R. Devault	J. B. Devault
J. A. Hatcher	W. B. Hatcher and S. T. Hatcher

The Hatcher brothers run on the same mine crew out of Jaeger, W. Va.

C. E. HAMMER.

NEWS

Montreal Terminal Controversy Renewed

Northeastern belt line, 11 miles long, main subject of discussion

While there is no interference with the main terminal development of the Canadian National in Montreal and for which project Parliament two years ago at Ottawa voted \$50,000,000 the railway is meeting with persistent and active opposition from the city authorities in its scheme for a northeastern belt line from Longue Pointe to Eastern Junction. This would have a mileage of 11 miles and it is the opinion of the company that it will prove a big revenue producer in that it is certain to stimulate the development of a big industrial area in that region and, as a consequence, a large amount of profitable freight traffic. Mayor Camillien Houde and many of his City Council have fought this project and it now develops that the Canadian Pacific will ask Parliament for approval of a line through the same territory.

A big deputation from Montreal went to Ottawa last week and interviewed the Federal Cabinet and asked the Ministers to order the Railway Board to order a rehearing of the belt line case. This request was granted. Last December the Railway Board went to Montreal and the then chairman, Hon. Harrison A. McKeown, made it plain that the Board wanted a speedy settlement of the belt line controversy. He asked if it were possible for the railway and city engineers to agree on a modified project. Failing that he declared he would ask the disputants to accept the offices of T. L. Simmons, Chief Engineer of the Board, whose report, in fact, was given effect to by an order of the Board. The report really gave approval to the Canadian National plan. Mayor Houde, though, wanted further delay and last Saturday Premier R. B. Bennett gave him the delay, after an hour's argument by opposing counsel.

The actual basis of last Saturday's hearing was a long petition recently sent to the Cabinet and the central point of this petition was a request that the Railway Board order a modification of the belt line plan by which the railway would be compelled to depress five of the 11 miles, on the east end, in a trench. To this proposal the railway is strongly opposed, and, strangely, this petition was only once referred to at the hearing.

"The steam railroads furnish the best and cheapest transportation service available anywhere in the world. Their present state is, in many respects, deplorable. We cannot contemplate their destruction without anticipating ruin to ourselves; nor can we promote our own interests more directly than by assuring their prosperity. They were the means with which we opened up and developed the country; they remain the means upon which we must depend not alone for the future success or failure of this country as an economic entity but for our very existence in the long future. The price we shall have to pay, if we would have progress, is individual and national righteousness."

—L. F. Lorie, in the *Manufacturers Record*.

A. E. R. A. Convention

April 30 is the closing date for the receipt of applications for exhibit space at the fiftieth annual convention and exhibition of the American Electric Railway Association to be held at Atlantic City September 26 to October 2, inclusive.

Since the coming convention marks the golden jubilee of the A. E. R. A., manufacturers whose products are to be exhibited are being requested to arrange their displays to include historical material. It is thus expected that old equipment will be featured alongside modern designs.

Cotton Belt Wins Tax Case

The District court for the Southern district of Illinois has granted the St. Louis Southwestern a permanent injunction restraining the secretary of state of Illinois from collecting a tax imposed on foreign corporations operating within the state. The court, composed of Circuit Judges Alschuler and Page, and District Judge Fitzhenry, also held that the law which imposes a minimum franchise tax based on the entire capital stock is invalid. Under the Illinois law, a tax is imposed on that proportion of the issued capital stock of foreign corporations represented by business and property in the state, but the minimum tax is based on the entire capital stock. The Cotton Belt operates over the Illinois division of the Missouri Pacific between Thebes, Ill., and East St. Louis.

Western Lines Propose Store-Door Delivery

Plans for inauguration of service on l. c. l. freight announced by 13 railroads

Plans to provide store-door collection and delivery service for l.c.l. freight have been announced by 13 southwestern and middle-western railways. In one instance 11 southwestern roads are acting together, while in the other, the Chicago, Milwaukee, St. Paul & Pacific and the Chicago & North Western propose to offer pick-up and delivery service at a number of points along their lines in northern Illinois, Wisconsin, and Minnesota. In each case the railways propose to offer the service themselves on their own bills of lading, rather than through the medium of subsidiary companies, the expedient which has been resorted to by several roads in the past.

The announcement of the plans of the southwestern lines came from a committee of vice-presidents representing all of the railroads involved. The roads on which the service will be established are the Missouri Pacific, the Texas & Pacific, the St. Louis-San Francisco, the St. Louis Southwestern, the Missouri-Kansas-Texas, the Southern Pacific, the Western Pacific, the Chicago, Rock Island & Pacific, the Atchison, Topeka & Santa Fe, the Kansas City Southern, the Louisiana & Arkansas, and the Burlington-Rock Island.

The plans provide for pick-up and delivery service at no additional cost over the present l.c.l. rates on shipments moving approximately 300 miles or less. An additional service fee will be charged for the pick-up and delivery service on shipments moving more than 300 miles. Shippers will have the option of using the pick-up or delivery service or not, as they prefer, or to use either one without the other.

The plan is admittedly an effort of the railroads to retain and regain short-haul package freight, which the railways have been losing in increasing quantities to competitive truck lines. The pick-up and delivery service at all stations involved will be arranged by contracts with local trucking organizations at each point.

The tariffs to cover the new service have not yet been filed with the Interstate Commerce Commission and with the various state commissions, but they are in process of preparation and it is hoped that the service may be started within 60 days. The announcement follows

(Continued on page 647)

Annual Reports

Norfolk and Western Railway Company, Thirty-fifth Annual Report

ROANOKE, VA., March 18th, 1931.

To the Stockholders of the Norfolk and Western Railway Company:

Your Board of Directors submits the following report for the year which ended December 31st, 1930.

Mileage of Road and Track in Operation

	December 31st, 1930 Miles	December 31st, 1929 Miles	Increase or Decrease Miles
Main Line	1,543.66	1,543.75	Dec. .09
Branches			
Operated as second track 127.28		127.28	
Other branches	529.55	531.20	
	656.83	658.48	Dec. 1.65
Total miles	2,200.49	2,202.23	Dec. 1.74
Lines operated under lease	22.27	22.27	
Lines operated under trackage rights	13.86	15.60	Dec. 1.74
Total miles of road in operation	2,236.62	2,240.10	Dec. 3.48
Second track	623.33	623.33	
Third track	13.58	13.58	
Sidings and yard tracks	1,703.29	1,652.01	Inc. 51.28
Total miles of all tracks in operation	4,576.82	4,529.02	Inc. 47.80
Average miles of road operated	2,239.80	2,240.09	Dec. .29
Average miles of track operated	4,533.39	4,501.37	Inc. 32.02

The decrease in miles of road in operation was as follows:

Warehouse Yard Line, Columbus, O., portion retired	0.10
Konnarock Branch, retired	1.65
White Top Railway (Operated under trackage rights) retired	1.74
	3.49

Less:

Main Line Shenandoah Division (In Roanoke Terminal) extended	0.01
Net decrease	3.48

The Year in Brief

Following is a comparison of 1930 figures with those for 1929:

	1930	1929	Increase or Decrease
Revenue from freight	\$93,168,818.78	\$108,351,498.62	Dec. \$15,182,679.84
Revenue from passengers	3,869,012.03	5,110,927.78	Dec. 1,241,915.75
Revenue from mail, express and miscellaneous	3,492,627.25	4,169,325.20	Dec. 676,697.95
Total Revenue from operation	\$100,530,458.06	\$117,631,751.60	Dec. \$17,101,293.54
Maintenance of roadway and structures	\$11,831,477.31	\$14,838,067.14	Dec. \$3,006,589.83
Maintenance of equipment	18,803,899.83	20,848,612.11	Dec. 2,044,712.28
Transportation — expense of operation	24,297,149.38	25,897,415.49	Dec. 1,600,266.11
Other expenses	4,743,198.58	4,467,152.42	Inc. 276,046.16
Total Expense of operation	\$59,675,725.10	\$66,051,247.16	Dec. \$6,375,522.06
Net Revenue from operation	\$40,854,732.96	\$51,580,504.44	Dec. \$10,725,771.48
Ratio of operating expense to total operating revenue	59.36%	56.15%	Inc. 3.21%
Federal, state and local taxes	\$9,850,000.00	\$10,300,000.00	Dec. \$450,000.00
Uncollectible revenue charges	5,437.32	34,158.32	Dec. 28,721.00
Net rental of equipment and joint facilities—Credit	2,641,562.91	2,961,850.19	Dec. 320,287.28
Net Railway Operating Income	\$33,640,858.55	\$44,208,196.31	Dec. \$10,567,337.76
Other Income—mainly interest on investments—Net	3,120,477.71	2,577,092.62	Inc. 543,385.09

	1930	1929	Increase or Decrease
Gross Income from all sources	\$36,761,336.26	\$46,785,288.93	Dec. \$10,023,952.67
Interest paid on bonds and equipment obligations	\$4,944,570.85	\$4,998,827.62	Dec. \$54,256.77
Dividends on Adjustment Preferred stock —\$4. per share	919,692.00	919,692.00	
Balance of Income Earned per share on Common stock outstanding	\$30,897,073.41	\$40,866,769.31	Dec. \$9,969,695.90
	21.97	29.06	Dec. 7.08
Dividends on Common stock—\$12 per share	\$16,877,796.00	\$16,874,536.00	Inc. \$3,260.00
Funded Debt outstanding at end of year	*111,995,531.92	*115,405,531.92	Dec. 3,410,000.00
Capital stock outstanding at end of year	163,640,600.00	163,640,600.00	
Investment in road and Equipment at end of year	451,802,338.48	437,551,950.69	Inc. 14,250,387.79

* Includes, by direction of Interstate Commerce Commission, \$6,086,031.92 of bonds of City of Norfolk, Va., issued to provide funds to purchase land and construct Municipal Terminals at Norfolk, now under lease to Norfolk and Western Railway Company.

At the end of the year Funded Debt represented 40.63 per cent. of outstanding capital obligations and Capital Stock 59.37 per cent.

Capital Stock

The aggregate amounts of Adjustment Preferred and Common capital stock authorized by the stockholders and issued, including 77 shares (\$7,700) of Adjustment Preferred stock and 24 shares (\$2,400) of Common stock held in the Company's treasury, were as follows:

	Authorized by Stockholders	Issued Par Value	Shares
Adjustment Preferred stock	\$23,000,000	\$23,000,000	230,000
Common stock	250,000,000	140,650,700	1,406,507
Totals, December 31st, 1930	\$273,000,000	\$163,650,700	1,636,507
Totals, December 31st, 1929	\$273,000,000	\$163,650,700	1,636,507

Funded Debt

The aggregate Funded Debt actually outstanding was as follows:

	Dec. 31st, 1930	Dec. 31st, 1929	Increase or Decrease
Mortgage Bonds	\$95,128,500.00	\$95,273,500.00	Dec. \$145,000.00
Convertible Bonds (conversion privilege expired)	441,000.00	436,000.00	Inc. 5,000.00
Equipment Trust Obligations	10,340,000.00	13,610,000.00	Dec. 3,270,000.00
City of Norfolk, Va., Municipal Obligations (See note, page 6)	6,086,031.92	6,086,031.92	
Totals	\$111,995,531.92	\$115,405,531.92	Dec. \$3,410,000.00

Road and Equipment

The charges to Investment in Road and Equipment during the year were \$14,250,387.79.

The investment in road, equipment and miscellaneous physical property on December 31st, 1930, was \$457,706,124.07, of which \$44,603,105.46 was provided by appropriations from income and surplus, as shown by the General Balance Sheet.

New equipment received during the year was as follows:

- 5 steam passenger locomotives.
- 10 steam freight locomotives (built at Roanoke Shops).
- 727 box cars, 100,000 lbs. capacity, all steel (built at Roanoke Shops).
- 470 gondola cars, 180,000 lbs. capacity, all steel (built at Roanoke Shops).
- 3,400 hopper cars, 115,000 lbs. capacity, all steel.
- 7 tool cars (built at Roanoke Shops).
- 1 spreader car (built at Roanoke Shops).
- 1 maintenance of way flat car (built at Roanoke Shops).
- 2 automobile tractors.
- 1 motorcycle.

[ADVERTISEMENT]

Additions and Betterments to Way and Structures

122.54 miles of track were laid with 130-lb. rail, making a total of 1,636.08 miles of track now laid with this weight of rail. 314,920 cubic yards of stone and 23,657 cubic yards of prepared slag were used in standard ballasting on the main line.

At Columbus, Ohio, the work of separating grade crossings and elevating tracks, including the rearrangement and enlargement of Joyce Avenue Yard, was completed.

At Roanoke, Va., a new fireproof eight-story office building, adjoining the present General Office Building, is nearing completion, and will be ready for occupancy about April, 1931.

A new blacksmith shop, 120 feet in width by 666 feet in length, has been completed at Roanoke, Va.

At Portsmouth, Ohio, a three-story Passenger Station and Division Office Building is nearing completion, which will provide office facilities for the Division Superintendent, engineering and other forces, except those of the Motive Power Department.

New interlocking towers were erected at Portsmouth, Bannock and Columbus, Ohio.

Flood light towers were installed in yards at Petersburg, Va., and Columbus, Ohio.

Track scales of 100-ton capacity were installed at Ivanhoe, Va.

A high power transmission line was built between Cowan, Va., and Bluefield, W. Va., which furnishes current for switch lamps, for operating signals and pumping plants and for lighting stations at Belspring, Eggleston, Pembroke, Ripplemead, Pearisburg, Narrows, Lurich and Glen Lyn, Va. The dispatcher's line on the Durham District was extended from Lynchburg, Va., to Crewe, Va., providing a direct dispatching telephone line from Crewe, Va., to Durham, N. C. Long distance telephone line was installed from Shenandoah, Va., to Hagerstown, Md., making a complete long distance telephone circuit from Roanoke, Va., to Hagerstown, Md.

Reinforced concrete underpasses were constructed, one at Portsmouth, Ohio, and nine at Columbus, Ohio. Reinforced concrete overhead highway bridges were constructed at Natural Bridge and Chilhowie, Va., and Portsmouth and Watkins Yard, Ohio. A steel overhead highway bridge was constructed at Madison, N. C.

Twenty-five grade crossings were eliminated during the year, eight by construction of underpasses, three by construction of overhead bridges and fourteen by changes of road. Grade crossing with the Pennsylvania and Baltimore and Ohio railroads at Columbus, Ohio, was eliminated by construction of a 5-span, 4-track bridge of reinforced concrete piers and abutments.

4,250 linear feet of new steel bridges and 1,880 linear feet of new concrete bridges were built and 2,036 linear feet of light steel bridges were replaced, 1,416 feet by standard steel structures, 185 feet by concrete bridges and 435 feet by fit steel doubled. 82 linear feet of light steel bridges were strengthened by adding new center girders.

Timber trestle was replaced as follows: 2,310 linear feet with new steel, 235 linear feet with fit steel, 1,257 linear feet with concrete culvert and 550 linear feet filled.

Maintenance Expenditures

The charges to Maintenance of Way and Structures Accounts were as follows:

	1930	1929	Decrease	Per Cent.
Total Expenses	\$11,831,477.31	\$14,838,067.14	\$3,006,589.83	20.26
Average per mile of road operated	5,282.38	6,623.87	1,341.49	20.25
Average per mile of track operated	2,609.85	3,296.34	686.49	20.83

The charges to Maintenance of Equipment Accounts were as follows:

	1930	1929	Increase or Decrease	Per Cent.
Total Maintenance of Equipment Expenses	\$18,803,899.83	\$20,848,612.11	D. \$2,044,712.28	9.8
In which are included:				
Steam Locomotives:				
Repairs, retirements and depreciation	9,040,213.88	10,336,014.02	D. 1,295,800.14	12.5
Average per locomotive	11,726.68	12,823.84	D. 1,097.16	8.6
Average per 1000 locomotive miles	470.15	491.43	D. 21.28	4.3
Electric Locomotives (Double-units):				
Repairs, retirements and depreciation	326,482.18	313,220.60	I. 13,261.58	4.2
Average per locomotive	20,405.14	19,576.29	I. 828.85	4.2
Average per 1000 locomotive miles	657.22	573.70	I. 83.52	14.6
Freight Train Cars:				
Repairs, retirements and depreciation	6,152,280.66	6,746,914.37	D. 594,633.71	8.8
Average per freight car	125.66	143.31	D. 17.65	12.3

	1930	1929	Increase or Decrease	Per Cent.
Average per 1000 tons one mile	.44	.40	I.	.04 10.0
Passenger Train Cars:				
Repairs, retirements and depreciation	893,757.23	877,902.94	I.	15,854.29 1.8
Average per passenger car	1,924.13	1,836.31	I.	87.82 4.8
Average per 1000 passengers one mile	7.61	5.79	I.	1.82 3.1
Work Equipment: Repairs, retirements and depreciation	260,924.43	357,713.84	D.	96,789.41 27.1

There were in the shops undergoing and awaiting classified repairs at the close of the year 40 locomotives (23 of which needed only light repairs), or 5.1 per cent., 14 passenger cars, or 3.1 per cent., 392 freight and work equipment cars, or .8 per cent.

Traffic and Operating Revenue Comparisons

Comparison of traffic and operating revenue figures with those of the preceding year shows the following changes:

Number of passengers	1,791,416	decreased	650,725	26.65 per cent
Average haul of passengers	65.58 miles	increased	3.53 miles	5.69 "
Revenue from passenger fares	\$3,869,012.03	decreased	\$1,241,915.75	24.36 "
Average rate per passenger per mile	3.293 cents	decreased	.080 cents	2.37 "
Revenue freight carried	50,626,522 tons	decreased	9,086,273 tons	15.22 "
Average haul of freight	276.22 miles	decreased	3.96 miles	1.41 "
Revenue from freight transportation	\$93,168,818.78	decreased	\$15,182,679.84	14.01 "
Average rate per ton per mile	.666 cents	increased	.018 cents	2.78 "
Average tons of revenue freight per train mile	1,510.17	decreased	94.88 tons	5.91 "
Shipments of coal	39,852,557 tons	decreased	8,057,324 tons	16.82 "
Shipments of coke	444,167 tons	increased	37,576 tons	9.24 "
Shipments of ore	434,311 tons	decreased	52,293 tons	10.75 "
Shipments of pig and bloom iron	72,074 tons	decreased	11,522 tons	13.78 "
Shipments of lumber	884,083 tons	decreased	424,728 tons	32.45 "

Taxes

Accruals for taxes in the year amounted to \$9,850,000, a decrease of \$450,000 under the previous year. This amount was made up of United States Government taxes, \$3,850,000, and State, County and Municipal taxes, \$6,000,000. United States Government taxes decreased, compared with previous year, due to reduction in earnings. State, County and Municipal taxes increased due to higher levies or assessments.

Federal Valuation

The Interstate Commerce Commission on February 13th, 1931, issued and served upon your Company a tentative Recapture Report determining Values, Net Railway Operating Income and Recapture for the years from 1920 to 1926. The Commission in this report has ascertained excess Net Railway Operating Income aggregating \$31,698,689.00 for the three years, 1924, 1925 and 1926, one-half of which, viz.: \$15,849,344.51, is held to be recapturable and by the order directed to be paid to the Interstate Commerce Commission. Under the provisions of the Interstate Commerce Act the remaining half (if the order of the Commission should prevail) would be placed in a reserve fund established and maintained by your Company, which could be drawn upon for paying dividends or bond interest in any year when its Net Railway Operating Income was less than a sum equal to six per cent. of the value of the railway property held for and used by it in the service of transportation.

Your Company will file a Protest denying that the Values, Net Railway Operating Income and consequent recapturable amounts are correct and lawful. This Protest will raise the issues which will in due course be heard and determined by the Commission. If the Commission should adhere to the conclusions reached in the tentative Recapture Report, your Company will then carry the case into the courts and have the issues of fact and law there authoritatively determined.

The task of preparing and pricing inventories of your Company's property for the recapture years is about completed and your Company will be ready to press for hearing and determination of the case.

The Commission has made no report as to recapture for any year since 1926, but upon the theory of the Commission's present order the Company's operations in the years subsequent to 1926 would show additional recapturable income to an unascertainable amount.

The cost of valuation work for the calendar year 1930 was \$392,540.44, and the total cost of valuation to your Company from July 1st, 1916, to December 31st, 1930, has been \$2,496,131.50.

[ADVERTISEMENT]

NORFOLK AND WESTERN RAILWAY COMPANY

ASSETS

			Comparison with Dec. 31st, 1929
INVESTMENTS:			
Investment in Road and Equipment:			
Road		\$316,169,913.01	I. \$6,832,595.89
Equipment owned	\$96,112,259.75		
Equipment in Trust	39,520,165.72	135,632,425.47	I. 7,417,791.90
Sinking Funds (Account City of Norfolk bonds)		\$451,802,338.48	I. 153,540.66
Deposits in lieu of mortgaged property sold		880,496.27	I. 3,034.71
Miscellaneous Physical Property		36,020.68	I. 529,321.77
Investments in Affiliated Companies:		5,903,785.59	
Stocks: Pledged	\$647,740.00		
Unpledged	1,522,071.42	2,169,811.42	I. 30.00
Bonds		622,597.75	I. 165,002.50
Advances		13,970,081.20	I. 4,303,360.44
Other Investments:		16,762,490.37	
Stocks	\$25,000.00		
Bonds	44,509,698.09		D. 3,016,260.10
Total Investments		44,534,698.09	
CURRENT ASSETS:			
Cash:		\$519,919,829.48	
In Treasury	\$4,346,002.43		
In Transit	206,098.95		
Held in Trust for Relief Fund	58,827.76		
Special Deposits		\$4,610,929.14	D. 1,019,349.84
Loans and Bills Receivable		563,015.00	D. 28,880.75
Traffic and Car-Service Balances Receivable		17,754.97	D. 11,213.26
Net Balances Receivable from Agents and Conductors		1,238,812.90	D. 474,823.86
Miscellaneous Accounts Receivable		259,230.67	D. 16,759.05
Material and Supplies		802,193.76	D. 427,318.62
Interest and Dividends Receivable		7,415,207.59	D. 250,647.06
Other Current Assets		182,563.18	D. 44,564.64
Total Current Assets		46,875.83	D. 2,844.05
DEFERRED ASSETS:			
Working Fund Advances		15,136,583.04	
Norfolk and Western Railway Company and Pocahontas Coal and Coke Company	\$14,084.52		I. 20.00
Joint Purchase Money Mortgage Bonds	11,996,000.00		D. 457,000.00
Cost of Securities held in trust for Relief Fund	2,306,204.63		I. 249,900.09
Other Accounts	81,348.50		I. 848.50
Total Deferred Assets		14,397,637.65	
UNADJUSTED DEBITS:			
Rents and Insurance Premiums paid in advance	\$24,505.50		D. 71,945.84
Discount on Funded Debt	1,253,880.88		D. 135,132.42
Other Unadjusted Debits	3,473,917.81		D. 1,778,588.29
Securities Issued or Assumed—Unpledged.			
Par Value of holdings at close of year	\$183,100.00	4,752,304.19	
Total Unadjusted Debits		\$554,206,354.36	I. \$11,920,118.68

Relief and Pension Department

At the close of the year the Relief Fund had 20,677 members, equivalent to 83.58 per cent. of the total number of employees, a decrease in the year of 554 members and an increase of 4.96 per cent. in ratio of members to employees. Of the employees eligible to membership in the Relief Fund 97.21 per cent. were members at the close of the year. The members of the Fund contributed during the year \$756,757.54 and the Fund received additional income of \$99,096.22 from interest and \$163.90 from profit on securities matured. Against these total receipts of \$856,017.66 death benefits aggregating \$210,024.33 and sickness and accident disability benefits aggregating \$384,398.00 were paid, leaving a balance of \$261,595.33, which was added to the Fund's credit balance, now standing at \$2,365,032.39, comparing with \$2,103,437.06 on December 31st, 1929. In the same period the Company paid the operating expenses of the Fund amounting to \$139,835.19.

At the close of the year there were 756 employees on the Pension Roll, a net increase of 20 in the year, with an average pension of \$649.32 per annum, compared with an average pension of \$625.44 per annum at the close of 1929.

Pension Reserve Fund

In December, 1930, your Directors appropriated from Surplus the sum of \$543,365.28, which was paid over to the Trustees of the Pension Reserve Fund, this amount being figured from actuarial tables as sufficient to take care of pensions to the 96 employees retired in the year 1930 so long as they may live. The appropriations to date for retired employees total \$4,560,732.23. In 1930 the Fund was credited with interest and amortization aggregating \$134,867.94 and was charged with \$475,928.56 paid to the Railway Company in reimbursement for pensions paid during the year and with taxes amounting to \$18.06. At the close of the year the Trustees held securities of a face value of \$3,258,000, having a book value of \$3,006,652.65, and \$421.55 in cash.

Pocahontas Coal and Coke Company

Earnings for the year 1930 from royalties on total output of coal mined and coke manufactured were \$1,397,828.68 and from other sources \$112,707.43, making total earnings of \$1,510,536.11 compared with \$1,849,231.45 in 1929. Operating expenses were \$173,418.62 and taxes \$169,263.30, leaving net earnings of \$1,167,854.19. Sinking fund and interest on funded debt, with other deductions, resulted in net income of \$297,937.02, a decrease of \$245,597.65 compared with the preceding year. The output of coal from the Company's leased property in 1930 was 13,610,572 gross tons and of coke 11,870 gross tons.

Under the sinking fund provision of the Pocahontas Coal Lands Purchase Money First Mortgage, dated December 2nd, 1901, \$340,739.10 accrued from royalties on coal mined during the calendar year 1930. From the beginning of the operation of the sinking fund in 1906 to December 31st, 1930, the accruals from royalties have aggregated \$7,254,354.73, and those from sales of lands \$239,624.79, a total of \$7,493,979.52 applicable to the purchase and retirement of mortgage bonds. Through this fund \$8,004,000 of bonds had been purchased and cancelled to December 31st, 1930, and \$360,000 subsequent thereto. The outstanding bonds on December 31st, 1930, were \$11,996,000, and at the date of this report \$11,636,000 out of original issue of \$20,000,000.

The Cincinnati Union Terminal Company

On November 23rd, 1927, The Cincinnati Union Terminal Company was incorporated to construct and operate in the City of Cincinnati, Ohio, a union passenger station, passenger equipment terminal and connecting tracks and approaches thereto and to equip said facilities.

The capital stock of the Terminal Company consists of 30,000 shares of preferred stock of the par value of \$100 each, which will be held by The Cincinnati Railroad Terminal Development Company, and 35,000 shares of common stock of the par value of \$100 each, to be subscribed for and owned in equal amounts

CONDENSED GENERAL BALANCE SHEET, DECEMBER 31st, 1930

LIABILITIES

Comparison with
Dec. 31st, 1929

CAPITAL STOCK.			
Adjustment Preferred	\$23,000,000.00		
Held in Treasury	7,700.00		
		\$22,992,300.00	
Common	\$140,650,700.00		
Held in Treasury	2,400.00		
		140,648,300.00	
Total Capital Stock			\$163,640,600.00
LONG TERM DEBT:			
Mortgage Bonds	\$95,301,500.00		
Held in Treasury	173,000.00		
		\$95,128,500.00	
Convertible Bonds	441,000.00		D. \$145,000.00
Equipment Obligations	10,340,000.00		I. 5,000.00
*Miscellaneous Obligations	6,086,031.92		D. 3,270,000.00
Total Long Term Debt		111,995,531.92	
CURRENT LIABILITIES:			
Traffic and Car-Service Balances Payable	\$419,519.72		D. 244,098.35
Audited Accounts and Wages Payable	2,541,475.08		D. 812,822.49
Miscellaneous Accounts Payable	99,350.92		D. 327,630.89
Relief Fund (Cash held in Trust)	58,827.76		I. 11,695.24
Interest Matured Unpaid	40,585.50		D. 1,289.00
Dividends Matured Unpaid	8,912.50		D. 10,816.75
Funded Debt Matured Unpaid	8,000.00		D. 19,000.00
Unmatured Dividends Declared	229,923.00		
Unmatured Interest Accrued	1,542,655.85		D. 33,525.00
Total Current Liabilities		4,949,250.33	
DEFERRED LIABILITIES:			
Cost of Securities Purchased for Relief Fund	\$2,306,204.63		I. 249,900.09
Other Accounts	134,685.69		D. 147,100.17
Total Deferred Liabilities		2,440,890.32	
JOINT LIABILITIES:			
Norfolk and Western Railway Company and Pocahontas Coal and Coke Company			
Joint Purchase Money Mortgage Bonds		11,996,000.00	D. 457,000.00
UNADJUSTED CREDITS:			
Tax Liability	\$6,929,857.40		D. 413,934.53
Insurance and Casualty Reserves	246,411.22		I. 23,063.66
Accrued Depreciation—Road	12,116,853.69		I. 644,142.95
Accrued Depreciation—Equipment	34,030,070.29		I. 1,522,446.47
Accrued Depreciation—Miscellaneous Physical Property	1,368,479.74		I. 141,672.95
Other unadjusted credits	2,351,825.31		D. 14,066.95
Total Unadjusted Credits		57,043,497.65	
CORPORATE SURPLUS:			
Sinking Fund Reserves		300,756.53	I. 180,715.96
Additions to Property through Income and Surplus:			
Road	\$21,297,779.19		
Equipment	23,305,326.27		
Total Appropriated Surplus		\$44,603,105.46	I. 175,586.26
Profit and Loss—Balance		157,236,722.15	I. 14,864,179.23
Total Corporate Surplus		201,839,827.61	
		\$554,206,354.36	I. \$11,920,118.68

* Bonds of City of Norfolk, Va., issued to provide funds to purchase land and construct municipal Terminals at Norfolk, now under lease to Norfolk and Western Railway Company, included in Long Term Debt by Direction of Bureau of Accounts of Interstate Commerce Commission.

of 5,000 shares each by your Company, The Baltimore and Ohio Railroad Company, The Chesapeake and Ohio Railway Company, The Cincinnati, New Orleans and Texas Pacific Railway Company, The Cleveland, Cincinnati, Chicago and St. Louis Railway Company, Louisville and Nashville Railroad Company, and The Pennsylvania Railroad Company, under the terms of an agreement of June 15th, 1929, between the Terminal Company, the seven owning companies and The Cincinnati Railroad Terminal Development Company.

A mortgage has been executed by the Terminal Company to the Guaranty Trust Company of New York, as Trustee, to secure an issue, in series, of \$46,500,000 First Mortgage Gold Bonds, bearing the endorsed joint and several guarantee of the seven owning companies. Under the terms of this mortgage \$12,000,000 of The Cincinnati Union Terminal Company First Mortgage 4½ per cent. Gold Bonds, Series A, maturing July 1st, 2020, have been sold.

An agreement between the Terminal Company, the seven owning companies and The Cincinnati Railroad Terminal Development Company obligates each of the owning companies to use the Terminal Company's passenger station as its principal passenger station in the City of Cincinnati, Ohio, and to use said station for all of the passenger trains which it operates into and out of the City of Cincinnati, except certain suburban trains. This agreement provides that the income, on a user basis, shall be sufficient to cover expense of operation, including taxes and interest, sinking funds and dividends.

Jacobs Fork Branch

An extension of Jacobs Fork Branch from Newhall, W. Va., for a distance of eight miles, to serve the new coal operations of The Pocahontas Fuel Company, Incorporated, (and its subsidiary, The Pocahontas Corporation) in McDowell County, W.

Va., and Tazewell County, Va., is nearing completion, and it is expected that the extension will be placed in operation about April 1st, 1931.

Big Sandy and Cumberland Railroad Company

The construction and reconstruction of the line of the Big Sandy and Cumberland Railroad Company, which commenced in 1928, has progressed to the extent that grading has been completed from Looneys Curve, near Devon, W. Va., to Grundy, Va., and to the Virginia-Kentucky State Line. Track has been laid from the connection at Looneys Curve to the mouth of Home Creek, and it is expected that the laying of track along Levisa River to the Virginia-Kentucky State Line will be completed by May 1st, 1931. Of the estimated cost of \$8,360,000 for this work, \$7,094,030 had been expended to December 31st, 1930. This line will be taken over by your Company and placed in operation on June 30th, 1931.

Guyandot and Tug River Railroad Company

Construction on the Guyandot and Tug River Railroad, from Wharnccliffe, W. Va., on your Company's line, to Gilbert, W. Va., a distance of 10.5 miles, authorized by the Interstate Commerce Commission on July 23rd, 1928, has continued during the year. Grading, masonry and tunnel excavation have been practically completed. Track has been laid from Wharnccliffe, W. Va., to the tunnel, a distance of 4 miles, and it is expected that track will be laid to Gilbert, W. Va., and the lining of the tunnel completed early in the fall of 1931. The cost of construction to December 31st, 1930, was \$1,695,124.61, while the estimated cost at completion will be \$2,500,000.

The Chesapeake and Ohio Railway Company litigated with your Company the legality of the Certificate issued by the Commission for construction of this railroad. The Supreme

Court of the United States, on March 9th, 1931, handed down a decision establishing the legality of the certificate.

Industries

During the year there were located on your Company's lines eighty new industries with a capitalization of \$6,480,000, and employing 3,700 persons.

There were also forty-seven additions to established plants, costing \$37,500,000, and employing 1,654 persons. One plant, destroyed by fire, was rebuilt with an investment of \$200,000 and employment of 600 persons.

Obituary

James K. Norfleet, a member of the Board of Directors since October 22nd, 1929, died at his home in Winston-Salem, N. C., on November 1st, 1930. Mr. Norfleet was born at Yanceyville, N. C., March 10th, 1870, and was educated in the public schools

of Winston-Salem and at the University of North Carolina. He had long been identified with the tobacco industry and with the public affairs of the State and of the City of Winston-Salem. At the time of his death Mr. Norfleet was Chairman of the Executive Committee of the Wachovia Bank and Trust Company of Winston-Salem, N. C.

Change in Board of Directors

At a meeting of the Board of Directors held November 25th, 1930, the vacancy in the Board, occasioned by the death of James K. Norfleet, was filled by the election of James G. Hanes, of Winston-Salem, N. C.

The Board expresses to the officers and employees its appreciation of the fidelity and capability with which they have served the Company throughout the year.

By order of the Board of Directors,

A. C. NEEDLES,
President

Canadian Pacific Railway Company

To the Shareholders:

The accounts of the Company for the year ended December 31, 1930, show the following results:—

Gross Earnings	\$180,900,804.45
Working Expenses (including all taxes).....	142,652,145.97
Net Earnings	\$ 38,248,658.48
Special Income	20,042,923.17
	\$ 58,291,581.65
Deduct Fixed Charges	19,159,864.86
Surplus	\$ 39,131,716.79
Contribution to Pension Fund	750,000.00
	\$ 38,381,716.79

From this there has been charged a half-yearly dividend on Preference Stock of 2 per cent., paid October 1, 1930.....\$ 2,418,651.68
And three quarterly dividends on Ordinary Stock of 2½ per cent. each, paid June 30, 1930, October 1, 1930, and December 31, 1930

24,867,907.50

27,286,559.18

\$ 11,095,157.61

From this there has been declared a second half-yearly dividend on Preference Stock of 2 per cent., payable April 1, 1931.....\$ 2,586,971.75
And a fourth quarterly dividend on Ordinary Stock of 2½ per cent., payable April 1, 1931

8,375,000.00

10,961,971.75

Leaving net surplus for the year.....\$ 133,185.86

SPECIAL INCOME FOR YEAR ENDED DECEMBER 31, 1930

Net Revenue from Investments and Available Resources, Exhibit "C"	\$ 3,402,368.75
Interest on Deposits, and Interest and Dividends on Other Securities	6,689,324.52
Net Earnings Ocean and Coastal Steamship Lines, and proportion of special distribution from Allan Line Steamship Company Limited	7,031,938.67
Net Earnings Commercial Telegraph and News Departments, Hotels, Rentals and Miscellaneous.....	2,919,291.23
	\$ 20,042,923.17

Earnings and Expenses

The working expenses for the year, including all taxes, amounted to 78.86 per cent. of the gross earnings, and the net earnings to 21.14 per cent., as compared with 79.43 per cent. and 20.57 per cent. respectively in 1929. Excluding taxes, the ratio of working expenses to gross earnings was 76.58 per cent., and in 1929, 77.00 per cent.

The gross earnings from railway operations for the year were less by \$28,830,151, freight earnings decreasing \$26,389,927 and passenger earnings \$6,037,011.

Working expenses were decreased by \$23,934,266, resulting in net earnings of \$38,248,658, or a decrease from the previous year of \$4,895,885.

The reduction in gross earnings is accounted for by lower than average grain movement and a lessened movement of manufactured products and general merchandise due to the lack of purchasing power which was so conspicuous during the year.

The liberal policy in providing for upkeep pursued in the past has made it possible for the Company to maintain the full efficiency of its properties and to aid the unemployment situa-

tion by anticipating renewals without imposing an undue burden on the reduced operating revenues of the year.

Special Income

The special income for the year exceeded that of 1929 by \$4,810,703 due to special distribution of surplus earnings of the Allan Line Steamship Company. In consequence of the liquidation of that Company during 1930, dividends to its members were declared amounting to \$737,774.50, and this amount is included in the Special Income Account for the year under the heading of "Interest on Deposits and Dividends on other Securities." Of the money standing to the credit of the Allan Line Deposit Account your Directors have taken into the Special Income Account \$6,500,000 as a portion of such surplus. While this is not a recurring item, your Directors have felt that a distribution of the surplus at this time is fully warranted.

Land Sales

The sales of agricultural lands for the year were 199,312 acres for \$3,137,108.97, being an average of \$15.74 per acre. Included in this area were 35,143 acres of irrigated land which brought \$41.09 per acre, so that the average for the balance was \$10.31 per acre.

Issue of Securities

During the year the Company issued and sold \$25,000,000 Thirty-year Four and one-half per cent. Collateral Trust Gold Bonds, secured by pledge of \$30,000,000 Four per cent. Consolidated Debenture Stock; \$14,250,000 Four and one-half per cent. Equipment Trust Certificates; \$1,000,000 and \$10,000,000 Four per cent. Consolidated Debenture Stock and £2,500,000 Four per cent Preference Stock.

Hotels

The operation of the Company's hotels resulted in a decrease of \$919,658 under the earnings of the previous year, due to the prevailing conditions which affected both commercial and tourist business.

The programme of hotel construction, extensions and improvements which have heretofore received your approval, is now practically completed, save as to the London Hotel, the site for which has recently been secured but the construction of which will probably not be commenced until some time during the year 1932.

Inasmuch as the operations of the hotels at Digby and Kentville, and that under construction at Yarmouth, Nova Scotia, have been or will be under the supervision of the Company's Hotel Department, and the money for their construction having been advanced by this Company, your Directors have decided to take these properties into the Company's Hotel Account and operate them directly under the officers of the Hotel Department.

Canadian Pacific Steamships, Limited

The net operating results of your combined Atlantic and Pacific fleets for the year showed a decrease in net earnings of \$1,887,719, due entirely to lower traffic, both passenger and freight, in consequence of the unusual commercial conditions which existed throughout the whole year.

With the entry into service of the "Empress of Britain" in May of this year the Company's programme of ocean steam-

ship construction is practically complete. Provision will have to be made from time to time, however, to replace the older tonnage when these ships become obsolete or unsuitable for the trade.

Your Company was able to well maintain its full share of the business offering during the past year.

No casualties of major importance to the vessels of your fleet took place in 1930.

During the year the steamships "Montroyal" and "Empress of Scotland" were sold.

Saint John-Digby Service

The steamship "Princess Helene," the construction of which you authorized for the Saint John-Digby service, was placed on that route in August last and has been found in every way suitable to the service and a welcome addition to the Company's facilities.

Branch Lines

The construction of branch lines in Western Canada previously authorized by the shareholders was proceeded with, 277.1 miles being graded, 237.4 miles of track laid and 360.4 miles ballasted on these new lines.

This construction has followed the lines of the extensive programme outlined in the Annual Reports of the last two years. Owing to the unprecedented conditions in Western Canada since this programme was formulated and the fact that the developments which certain of these lines were intended to serve have not been carried on, it became necessary to defer the commencement of the lines so affected. However, a substantial portion of the programme has been carried out, and it is the purpose of your Directors to continue it as conditions warrant. To that end application has been made to Parliament for extension, where necessary, of the powers previously granted to the Company, and in addition for authority to construct the following line:—

From a point on its Montreal Terminals Division to L'Epiphanie in the Province of Quebec.

Your approval will be asked for proceeding with the construction, as conditions warrant, of the undermentioned portions of branch lines and extensions for which parliamentary sanction has been received, and for the issue and sale of a sufficient amount of Consolidated Debenture Stock to meet the expenditure therefor:—

- | | |
|---|----------|
| 1. Swift Current Southeasterly, Vanguard—Meyronne, M. 45 to M. 76..... | 31 miles |
| 2. Moose Jaw Southwesterly Branch, Mankota West. M. 146 to M. 157 | 11 miles |
| 3. Rosetown Southeasterly, Rosetown-Gunnworth | 20 miles |
| 4. Lloydminster Northeasterly Branch, M. 25 to M. 45 | 20 miles |
| 5. Hamlin-Shellbrook | 25 miles |
| 6. Medstead Northeasterly | 37 miles |
| 7. Prince Albert—Lac la Biche, M. 90 to M. 94 ... | 4 miles |

In addition to the above mentioned lines, arrangements have been made for the completion of the Kettle Valley Railway line from Skaha on the Osooyoos Subdivision southerly to connect with the line already constructed from Okanagan Falls southerly in the Province of British Columbia, and application has been made to Parliament for the necessary authority therefor.

Agreements

Your confirmation and approval will be asked of the following agreements made by your Directors during the past year:—

1. Agreement, dated May 5, 1930, between your Company of the one part and The Canadian Northern Railway Company, The Grand Trunk Pacific Railway Company, The Grand Trunk Pacific Branch Lines Company and Canadian National Railway Company of the other part, amending and supplementing the Agreement between your Company and The Canadian Northern Railway Company dated January 1, 1912, in reference to the joint use by the latter Company of your Company's passenger facilities at Regina, Saskatchewan.

2. Agreement, dated June 30, 1930, between your Company, British Columbia Electric Railway Company, Limited, and The Vancouver and Lulu Island Railway Company, whereby the Electric Company is granted the right to use the Vancouver and Lulu Island Railway for passenger business jointly with the use thereof by your Company for freight business, and the Electric Company agrees to perform with its electric motive power on behalf of your Company the movement of all freight traffic over the said railway, the Electric Company to pay your Company a fixed compensation for the rights granted to it in respect of passenger service and to receive a proportion of the revenue on freight traffic in payment for the services rendered by it in connection therewith.

3. Agreement, dated September 17, 1930, between The Canadian Northern Railway Company and Canadian National Railway Company of the one part and your Company of the other part, whereby your Company acquired the right to use a portion of the main line and the passenger station of the Canadian Northern at Humboldt, Saskatchewan, on the basis of paying one-half the interest charge on capital account and a wheelage proportion, with a minimum of 20%, of maintenance and operation expenses.

4. Agreement, dated September 17, 1930, between The Canadian Northern Railway Company and Canadian National Railway Company of the one part and your Company of the other part, whereby your Company acquired the right to use the Canadian Northern line from Fenton to Prince Albert; its Prince Albert Terminals; its line from Prince Albert through Shellbrook to Debden; and its line from Paddockwood Junction to Henribourg, on the basis of paying one-half the interest charge on capital account and a wheelage proportion, with a minimum of 20%, of maintenance and operation expenses.

5. Agreement, dated September 17, 1930, between The Grand Trunk Pacific Branch Lines Company, The Canadian Northern Railway Company and Canadian National Railway Company of the one part and your Company of the other part, whereby your Company acquired the right to use the Canadian National Line from Cutknife through Battleford to North Battleford, including portions of the terminals of the owning companies at the two latter points, on the basis of paying one-half the interest charge on capital account and a wheelage proportion, with a minimum of 20%, of the maintenance and operation expenses.

6. Agreement, dated November 22, 1930, between The Algoma Eastern Railway Company and your Company of the one part and The Canadian Northern Ontario Railway Company and Canadian National Railway Company of the other part, whereby the two latter Companies are granted the right to use that portion of the Algoma Eastern Railway between Sudbury and Clara Belle Junction, on the basis of paying one-half the interest charge on capital account and a wheelage proportion, with a minimum of 20%, of the maintenance and operation expenses.

7. Agreement, dated December 12, 1930, between your Company and The Canadian Northern Ontario Railway Company and Canadian National Railway Company, whereby The Canadian Northern Ontario Railway Company and Canadian National Railway Company are given the joint use of the railway facilities of your Company at Harrowsmith, Ontario, on the basis of paying one-half the interest charge on capital account and one-half of the maintenance and operation expenses.

Leases

There will be submitted for your consideration and approval a lease of the railway of The Algoma Eastern Railway Company extending from Sudbury to Turner, in the Province of Ontario, a distance of 83.89 miles, the purchase of the capital stock of which Company was authorized at the last Annual Meeting; and a lease of the railways owned and leased by the Montreal and Atlantic Railway Company, extending from Farnham to the international boundary near Richford, from Drummondville to Enlaugra, from Stanbridge to St. Guillaume, in the Province of Quebec, and from Richford to Newport, in the State of Vermont, a total distance of 184.6 miles, which railways have for many years been operated by your Company for the owners.

Esquimalt and Nanaimo Railway Company

Your Company's lease of the railways of The Esquimalt and Nanaimo Railway Company made in 1912 reserves a rental equivalent to the interest on the bonds of The Esquimalt and Nanaimo Company not exceeding fourteen thousand dollars per mile of the railway extending from the City of Victoria to the Town of Wellington, and thirty thousand dollars per mile for all other railways of that Company. Extensions and improvements already made, or in contemplation, have rendered that limitation inadequate, and your Directors will ask for authority to enter into an agreement with The Esquimalt and Nanaimo Railway Company to increase the bond issue on which this Company will pay interest by way of rental to an amount which, together with the bonds already issued, will not exceed fifty thousand dollars per mile of railway.

Aroostook Valley Railroad Company

Subject to the approval of the Interstate Commerce Commission of the United States, your Directors concluded an agreement with the Honourable Arthur R. Gould of Presque Isle, Maine, for the acquisition of 2,000 shares of the stock of the Aroostook Valley Railroad Company, which owns and operates an electric line approximately 32 miles in length, from a connection with your Company's line at Washburn Junction, near Presque Isle, Maine, through one of the most productive

CANADIAN PACIFIC RAILWAY COMPANY

GENERAL BALANCE SHEET, DECEMBER 31, 1930

ASSETS		LIABILITIES	
PROPERTY INVESTMENT:		CAPITAL STOCK:	
Railway, Rolling Stock Equipment, Lake and River Steamers and Hotels	\$837,754,369.82	Ordinary Stock	\$335,000,000.00
OCEAN AND COASTAL STEAMSHIPS, Exhibit "A"	114,135,160.83	Four Per Cent. Preference Stock	129,348,587.79
ACQUIRED SECURITIES (Cost):			\$464,348,587.79
Exhibit "B"	164,962,777.87	FOUR PER CENT. CONSOLIDATED DEBENTURE STOCK	\$398,911,548.74
ADVANCES TO CONTROLLED PROPERTIES AND INSURANCE PREMIUMS	21,949,256.70	LESS: Collateral as below*	107,500,000.00
INVESTMENTS AND AVAILABLE RESOURCES:			291,411,548.74
Deferred Payments on Lands and Townsites	\$55,310,828.87	TEN YEAR 5% COLLATERAL TRUST GOLD BONDS (1934)*	12,000,000.00
Provincial and Municipal Securities	792,721.29	TWENTY YEAR 4½% COLLATERAL TRUST GOLD BONDS (1946)*	20,000,000.00
Miscellaneous Investments, Exhibit "C," Cost	31,701,678.77	TWENTY-FIVE YEARS 5% COLLATERAL TRUST GOLD BONDS (1954)*	30,000,000.00
Assets in Lands and Properties, Exhibit "D"	62,678,850.73	THIRTY YEAR 4½% COLLATERAL TRUST GOLD BONDS (1960)*	25,000,000.00
	150,484,079.66	TWENTY YEAR 4½% SINKING FUND SECURED NOTE CERTIFICATES (1944) ..	\$ 30,000,000.00
WORKING ASSETS:		LESS: Purchased by Trustee and cancelled	7,682,100.00
Material and Supplies on Hand	\$25,445,272.20		22,317,900.00
Agents' and Conductors' Balances	5,139,055.34	LESS: Amount held by Trustee	28,831.34
Net Traffic Balances	1,903,468.44		22,289,068.66
Imperial, Dominion and United States Governments, Accounts due for Transportation, etc.	1,170,127.20	MORTGAGE BONDS:	
Miscellaneous Accounts Receivable	10,242,664.70	Algoma Branch 1st Mortgage 5 per cent	3,650,000.00
Cash in Hand	\$31,283,974.40	Lacombe & Blindman Valley Railway 1st Mortgage 5 per cent	273,700.00
Dominion Government Bonds	7,499,487.50	EQUIPMENT OBLIGATIONS \$ 53,250,000.00	
	38,783,461.90	LESS: Balance on hand with Trustees	10,985,663.25
	82,684,049.78		42,264,336.75
	\$1,371,969,694.66	CURRENT:	
		Audited Vouchers	7,806,115.82
		Pay Rolls	3,587,400.88
		Miscellaneous Accounts Payable	2,949,676.37
			14,343,193.07
		ACCRUED:	
		Rentals of Leased Lines and Coupons on Mortgage Bonds	1,137,754.24
		RESERVES AND APPROPRIATIONS:	
		Equipment Replacement	9,019,677.75
		Steamship Replacement	18,620,357.95
		Reserve Fund for Contingencies and for Contingent Taxes	14,103,271.56
		Special Reserve to meet Taxes imposed by Dominion Government	1,069,019.50
			42,812,326.76
		PREMIUM ON CAPITAL STOCK SOLD (LESS ON BONDS AND NOTES)	69,288,692.37
		NET PROCEEDS LANDS AND TOWNSITES	76,170,021.23
		SURPLUS REVENUE FROM OPERATION	146,822,872.07
		SURPLUS IN OTHER ASSETS	110,157,592.98
			\$1,371,969,694.66

E. E. LLOYD, Comptroller.

AUDITORS' CERTIFICATE.

We have examined the Books and Records of the Canadian Pacific Railway Co. for the year ending December 31, 1930, and having compared the above Balance Sheet therewith, we certify that, in our opinion it is properly drawn up so as to show the true financial position of the Company at that date, and that the statement of Income contained in the Directors' Report is correct.

Montreal, March 6, 1931.

PRICE, WATERHOUSE & CO.,
Chartered Accountants, (England).

portions of the potato-growing district of that State, forming a valuable feeder to your system. The price to be paid for the stock was based upon a valuation of the property made by three valuers, the majority of whom have arrived at conclusions indicating a value of \$264.87 per share. In accordance with the terms of the agreement of purchase, application has been made to the Interstate Commerce Commission for authority to acquire this stock, and, provided such authority is granted, your confirmation and approval of the agreement will be asked. Upon completion of the purchase your Company will hold 2,400 of the total outstanding capital stock of 2,970 shares of the Aroostook Valley Railroad Company.

Minneapolis, St. Paul & Sault Ste. Marie Railway Company

The results of the operations of your subsidiary the Minneapolis, St. Paul & Sault Ste. Marie Railway Company, including the Wisconsin Central, were again extremely disappointing. The lower earnings were largely the result of poor business on the Chicago Division, the earnings of which are made up principally from the carriage of products of mines and forests and miscellaneous merchandise. Shortly after the recession in the fall of 1929 the commercial business of the Soo Line began to show a falling-off which reached serious proportions during 1930, the reduction in car-loadings of the products of mines and forests and livestock exceeding 70,000 cars.

The loss in the movement of agricultural products was not so serious because of the fair crops of 1929 and 1930. Since the organization of the Federal Farm Board in 1929 the natural flow of farm products to market has been considerably retarded. Advice given to farmers in the fall of 1929 and again in the fall of 1930 to hold their grain for higher prices resulted in many thousands refusing to sell and finally being forced to do so at a much lower price. This situation resulted in decreasing the farmers' buying power and had a very depressing effect upon business.

The new tariffs put into effect by the United States and Canada during 1930 have had quite an effect upon the business of your subsidiary. The loss in interchange of loaded cars between the Canadian Pacific and the Soo Line amounted to 13,918 cars for the year. However, part of this loss undoubtedly arose from business conditions.

The property has been well maintained and the Company is now in a position to continue the reductions already made in their expenses until such time as business again becomes normal.

Lucerne-in-Quebec Community Association, Limited

The above Association was incorporated 1929 with a view to establishing a large and exclusive resort in the vicinity of Montebello in the Province of Quebec. Your Company acquired a minority interest in the enterprise, but through the inability of the American interest to provide the necessary capital, it took over the completion of the work of construction and the operation of the undertaking. While the extensive work on the property has not yet been entirely completed, it is sufficiently advanced to indicate the unique and attractive nature of the

resort, which has already received much favourable comment. Your Company has taken bonds on the property and assets of the Community Association as security for its advances. Pending other financial arrangement or the gradual retirement of the bonds through sales of lots, bonds to the extent of \$5,000,000 are held in the Company's treasury.

Capital Expenditures

In anticipation of your confirmation your Directors authorized capital appropriations, in addition to those approved at the last Annual Meeting, aggregating for the year 1930, \$4,895,470, and ask your approval of expenditures on capital account during the present year of \$8,010,528. Of this amount the principal items are:—

Replacement and enlargement of structures in permanent form	\$ 741,001
Additional stations, round houses, freight sheds and shops, and extensions to existing buildings	124,890
Tie plates, rail anchors, ballasting, ditching, and miscellaneous roadway betterments	1,444,559
Replacement of rail in main and branch line tracks with heavier section	618,210
Installation of automatic signals	142,400
Additional terminal and side track accommodation	97,246
Improving coaling and watering facilities	115,368
Mechanical Department, machinery at various points	236,234
Improvements in connection with telegraph service	1,484,513
British Columbia Coast Steamships	19,200

[ADVERTISEMENT]

Savona—Spences Bridge, grade reduction	637,000
Yarmouth. Lakeside Inn	415,000
Regina, station, postal and telegraph buildings	1,427,000

The balance of the amount is required for miscellaneous works to improve facilities and effect economies over the whole system.

Special Construction under Agreements with Dominion Government

For the purpose of aiding in the immediate relief of unemployment in Canada the Company in October last agreed with the Dominion Government to undertake and prosecute certain construction works, the capital expenditure involved in which you have already approved or will be asked to approve at the Annual Meeting, as set forth in the following schedule, the said works to be completed on or about December 31, 1931, at a total estimated cost of \$11,514,000, upon which amount the Government agreed to pay to the Company out of the moneys provided by the Unemployment Relief Act 1930, interest at the rate of 5% per annum for a period of 18 months.

Schedule

Description of Work	Estimated Expenditure
Laying track Crossfield Extension, 28 miles	\$ 361,000
Laying track Lacombe North Western Extension, 22 miles	220,000
Purchase and Installation—150 miles heavy rail in British Columbia	2,530,200
Purchase and Installation—100 miles heavy rail in Ontario	1,345,800
Grade revision between Savona and Spences Bridge, B. C.	697,000
COMPLETE CONSTRUCTION NEW LINES	
Nipawin-Henribourg, 20 miles	600,000
Medstead-Meadow Lake, 35 miles	1,260,000
Regina Station, approaches and tracks	1,250,000
Rosetown-Gunnworth, 20 miles	700,000
Dog Lake-Kettle Valley, 9 miles	640,000
Hamlin-Shellbrook, 25 miles	900,000
Gravel Ballasting, New Brunswick Dist., 20 miles	60,000
Rock Blasting, Lachute Subdivision, 25 miles	125,000
Rock Ballasting, Galt Subdivision	750,000
Rock Blasting, Algoma District, 15 miles	75,000
	\$11,514,000

Stock Holdings

The holdings of the Ordinary and Preference Stocks of the Company in December, 1930, were distributed as follows:—

	Ordinary	Preference	Ordinary and Preference combined
United Kingdom	43.27%	97.42%	58.11%
Canada	19.40%	.47%	14.21%
United States	31.18%	.62%	22.81%
Other Countries	6.15%	1.49%	4.87%

The expectation of your Directors that the change in the par value of the shares of Ordinary Capital Stock, which you authorized at the last Annual Meeting, would result in an increased number of Canadian shareholders is already being realized as is shown by the following comparative statement:—

Ordinary Capital Stock

	Number of Shareholders		Increase
	December 1929	December 1930	
United Kingdom	19,299	20,977	1,678
Canada	18,062	27,243	9,181
United States	11,098	13,212	2,114
Other Countries	4,176	4,326	150
Totals	52,635	65,758	13,123

Increase in Capital Stock

Your Company is authorized by law to increase its Capital Stock, when authorized to do so by its Shareholders, to an aggregate amount of \$500,000,000. While your Directors are desirous of confining additional commitments of the Company within the narrowest possible limits they realize that the provision of additional railway facilities is from time to time likely to become necessary, and in order that they may be in a position to issue Ordinary Stock if they should deem that to be the most advantageous means of providing the capital required, your authority will be asked at the forthcoming meeting for the issue of \$50,000,000 of Ordinary Stock in such amounts, on such terms and at such times as the Directors shall from time to time decide.

Retiring Directors

The undermentioned Directors will retire from office at the approaching Annual Meeting. They are eligible for re-election.

COLONEL HENRY COCKSHUTT
SIR HERBERT S. HOLT
COLONEL FRANK S. MEIGHEN, C.M.G.
MR. ROBERT C. STANLEY

For the Directors,

E. W. BEATTY
President

MONTREAL, MARCH 9, 1931.

[ADVERTISEMENT]

News

(Continued from page 639)

negotiations which have extended over a period of weeks. Some of the roads involved, including the Missouri Pacific, the Texas & Pacific, the Southern Pacific, the Cotton Belt and the Missouri-Kansas-Texas, have been experimenting for some time with store-door collection and delivery service through subsidiary transportation companies. The results secured through these operations are the basis of the expectation that the proposed service, operated by all of the southwestern lines, will be effective in meeting truck competition. The service is proposed to be established along the lines of the railroads mentioned in Missouri, Kansas, Oklahoma, Arkansas, Texas, and Louisiana, and does not affect points on these lines in other states.

In the tariff which it is preparing and which it proposes to make effective May 1, the Milwaukee will also offer pick-up and delivery service at certain designated points, for additional charges above the usual freight rates. Like the other railways, it proposes to use the services of trucking organizations already in exist-

ence for the provision of the pick-up and delivery service under contracts.

Similar arrangements have been made by the Chicago & North Western, which proposes to establish a tariff which will include in its service the issuance of a bill of lading providing for service from the door of the shipper to the door of the consignee, with an additional charge for the pick-up and delivery service based on the actual cost to the railroad of the drayage. It has been decided to make the service effective quite generally in Illinois, Wisconsin, and Minnesota, and later on similar arrangements will be effected in all of the nine states served by the North Western.

Report of Bureau of Explosives

Colonel B. W. Dunn, chief inspector of the Bureau for the safe transportation of explosives and other dangerous articles, has issued the annual report of the Bureau for the calendar year 1930. The number of railroads supporting the bureau is now 477, operating 307,336 miles of road; the force of inspectors numbers 30, and the inspections recorded during the year totaled over 28,000, including 12,937 cars containing dangerous articles other than explosives. Lectures and

meetings carried on by the bureau were attended by 14,221 persons. The report, including appendices, fills 83 pages and apparently every possible question that could be proposed in connection with the work of the bureau is fully answered.

In explosives alone—black powder, dynamite, etc.—there were only 15 accidents during the year and no persons were killed; property loss only \$71; and yet the total quantity transported on the railroads of America in the 12 months was about 250,000 tons. This excellent record is only a trifle better than the record of the four years preceding.

Table No. 1, the summary of accidents of all kinds, shows 1090 accidents, nine persons killed, 21 injured; property loss \$420,572. This is only 45 per cent of the average annual losses during the preceding 10 years. Supplementary tables show summaries of reported accidents for 20 years, classified according to the kind or cause, as for instance, gasoline, alcohol, charcoal, paint, etc.

The 19 fires occurring in the transportation of gasoline in 1930 are shown in a separate table with full notes of the cause of each one; total loss \$350,974; persons killed seven; persons injured two.

(Continued on page 650)

Operating Statistics of Large Steam Railways—Selected Items for the Month of January, 1931,

Region, road and year	Average miles of road operated	Train-miles	Locomotive-miles		Car-miles		Ton-miles (thousands)		Average number of locomotives on line			Stored	
			Principal and helper	Light	Loaded (thousands)	Per cent loaded	Gross. Excluding locomotives and tenders	Net. Revenue and non-revenue	Service-able	Un-service-able	Per cent un-service-able		
New England Region:													
Boston & Albany.....	1931	407	159,292	165,429	12,561	4,060	65.2	216,064	78,215	91	39	30.4	31
.....	1930	407	200,356	213,857	22,125	4,679	64.8	253,200	93,250	102	23	18.8	30
Boston & Maine.....	1931	2,066	317,452	366,052	35,877	10,404	67.1	569,594	213,675	258	48	15.7	80
.....	1930	2,056	357,289	422,199	53,615	11,821	68.9	630,329	243,541	258	53	17.0	69
N. Y., New H. & Hart.....	1931	2,094	395,482	458,801	24,157	12,545	62.4	718,254	273,606	273	81	22.9	35
.....	1930	2,106	435,379	503,356	30,101	14,243	62.6	794,854	301,224	287	57	16.6	51
Great Lakes Region:													
Delaware & Hudson.....	1931	876	272,651	357,257	35,923	8,247	60.2	553,792	247,833	243	28	10.5	117
.....	1930	875	327,155	434,003	49,731	9,749	62.2	620,016	294,392	235	35	12.8	82
Del., Lack. & Western.....	1931	998	414,351	533,378	51,525	12,816	65.4	755,044	313,852	218	63	22.3	26
.....	1930	998	484,805	537,473	61,496	15,479	64.9	908,619	378,802	222	56	20.2	23
Erie (inc. Chi. & Erie).....	1931	2,316	722,770	758,647	64,272	30,820	61.7	1,906,270	765,667	378	95	19.8	120
.....	1930	2,316	829,293	891,285	66,303	34,429	63.4	2,091,258	871,288	412	42	36.7	40
Grand Trunk Western.....	1931	1,019	228,618	232,018	3,987	6,281	64.3	360,761	131,101	72	31	26.0	32
.....	1930	1,020	276,863	280,778	4,871	8,013	66.0	440,235	164,546	88	31	31.2	25
Lehigh Valley.....	1931	1,343	449,621	482,196	48,823	13,539	62.9	843,035	360,893	237	108	31.2	25
.....	1930	1,343	508,582	556,064	62,101	15,139	65.3	905,679	394,822	253	80	24.1	23
Michigan Central.....	1931	1,869	405,746	408,309	9,795	13,119	61.2	761,111	268,860	155	61	28.1	45
.....	1930	1,820	526,439	528,246	19,267	17,078	60.7	981,729	343,909	192	44	18.7	32
New York Central.....	1931	6,468	1,715,920	1,880,453	135,385	61,845	60.1	3,887,049	1,690,559	927	431	31.7	320
.....	1930	6,468	2,093,133	2,304,989	174,270	73,058	60.2	4,596,589	1,970,915	1,013	310	23.5	225
New York, Chi. & St. L.....	1931	1,660	496,619	507,427	7,490	15,861	59.5	943,939	337,664	176	68	27.8	47
.....	1930	1,665	647,294	654,973	5,856	18,859	60.6	1,120,993	423,297	207	50	19.4	31
Pere Marquette.....	1931	2,201	314,281	324,525	2,361	7,444	60.5	467,577	185,895	167	19	10.4	63
.....	1930	2,178	414,036	417,473	2,940	9,609	62.6	590,296	250,719	174	25	12.3	30
Pitts. & Lake Erie.....	1931	232	87,129	88,63									

Compiled by Bureau of Statistics, Interstate Commerce Commission. Subject to revision.

Compared with January, 1930, for Roads with Annual Operating Revenues Above \$25,000,000

Region, road and year	Average number of freight cars on line			Per cent un-serv-ice-able	Gross ton-miles per train-hour, ex-cluding locomotives and tenders	Gross ton-miles per train-mile, ex-cluding locomotives and tenders	Net ton-miles per train-mile	Net ton-miles per loaded car-mile	Net ton-miles per car-day	Car-miles per car-day	Net ton-miles per mile of road per day	Pounds of coal per 1,000 gross ton-miles, including locomotives and tenders	Loco-motive-miles per locomotive-day
	Home	Foreign	Total										
New England Region:													
Boston & Albany.....1931	3,890	3,220	7,110	8.0	20,004	1,356	491	19.3	355	28.3	6,198	173	44.2
1930	4,125	3,783	7,908	5.6	18,511	1,264	465	19.9	380	29.4	7,389	179	61.0
Boston & Maine.....1931	11,565	7,942	19,507	7.9	21,819	1,794	673	20.5	353	25.6	3,337	123	42.4
1930	9,344	9,759	19,103	3.2	21,703	1,764	682	20.6	411	29.0	3,802	120	49.3
N. Y., New H. & Hart..1931	19,047	12,477	31,524	15.0	24,307	1,816	692	21.8	280	20.6	4,214	119	44.0
1930	17,288	13,686	30,974	9.3	23,186	1,826	692	21.1	314	23.7	4,614	118	50.0
Great Lakes Region:													
Delaware & Hudson.....1931	10,220	3,871	14,091	4.0	24,332	1,958	909	30.1	567	31.4	9,130	137	46.7
1930	9,694	4,949	14,643	4.1	23,707	1,895	900	30.2	649	34.5	10,853	142	57.8
Del., Lack. & Western..1931	19,508	4,466	23,974	5.6	24,561	1,836	763	24.5	422	26.4	10,143	160	58.0
1930	18,708	6,437	25,145	4.4	24,117	1,874	781	24.5	486	30.6	12,242	154	69.7
Erie (inc. Chi. & Erie)..1931	37,896	12,723	50,619	3.2	37,583	2,637	1,059	24.8	488	31.8	10,666	115	55.1
1930	35,264	16,498	51,762	3.0	33,409	2,522	1,051	25.3	543	33.8	12,136	122	61.4
Grand Trunk Western...1931	4,755	10,110	14,865	8.7	25,950	1,578	573	20.9	284	21.2	4,150	104	67.0
1930	4,115	11,200	15,315	5.3	22,166	1,590	594	20.5	347	25.6	5,206	117	77.6
Lehigh Valley .....1931	21,329	6,043	27,372	7.9	27,619	1,875	803	26.7	425	25.4	8,670	157	49.6
1930	19,348	8,626	27,974	6.3	25,473	1,781	776	26.1	455	26.7	9,475	164	59.8
Michigan Central.....1931	26,707	16,472	43,179	5.0	33,737	1,878	663	20.5	201	16.0	4,640	116	62.4
1930	26,323	14,357	40,680	3.2	31,773	1,865	653	20.1	273	22.3	6,097	124	74.9
New York Central.....1931	82,335	57,380	139,715	8.3	32,522	2,265	938	26.0	372	23.8	8,028	112	47.9
1930	78,457	60,504	138,961	4.6	29,737	2,196	942	27.0	458	28.2	9,830	118	60.5
New York, Chi. & St. L..1931	15,915	7,367	23,282	6.1	29,407	1,901	680	21.3	468	36.9	6,561	109	68.2
1930	15,072	9,176	24,248	6.9	24,910	1,732	654	22.4	563	41.4	8,202	121	82.8
Pere Marquette.....1931	13,373	4,345	17,718	3.1	23,827	1,488	591	25.0	338	22.4	2,724	101	56.6
1930	12,599	7,455	20,054	3.3	20,697	1,426	606	26.1	403	24.7	3,714	118	68.2
Pitts. & Lake Erie.....1931	21,382	4,053	25,435	7.0	36,812	2,951	1,604	44.3	177	7.1	19,431	113	39.1
1930	16,804	5,428	22,232	7.4	34,050	2,591	1,424	43.8	256	9.8	24,531	128	62.3
Wabash .....1931	21,129	8,544	29,673	5.7	31,682	1,711	594	20.8	431	34.1	5,122	124	56.6
1930	18,167	12,286	30,453	2.3	25,868	1,634	622	22.5	531	37.4	6,473	140	77.2
Central Eastern Region:													
Baltimore & Ohio.....1931	82,406	17,494	99,900	5.8	25,544	2,105	945	30.9	433	23.5	7,817	156	50.2
1930	75,991	23,993	99,984	4.5	22,984	1,958	904	31.4	518	27.2	9,339	160	60.7
Big Four Lines.....1931	25,204	21,068	46,272	4.7	31,185	1,995	920	30.6	415	22.4	7,089	120	52.4
1930	25,605	21,477	47,082	4.0	26,612	1,929	897	31.9	540	28.9	9,370	131	67.0
Central of New Jersey..1931	18,326	7,370	25,696	8.6	25,864	2,086	981	33.4	250	13.4	9,297	152	42.8
1930	17,892	9,525	27,417	4.7	24,435	1,945	913	33.3	286	15.4	11,322	153	53.3
Chicago & Eastern Ill...1931	6,023	2,567	8,590	6.8	26,636	1,573	697	28.7	520	29.0	4,756	138	43.4
1930	12,772	3,919	16,691	42.4	21,827	1,525	701	29.6	347	18.4	6,124	149	55.0
Elgin, Joliet & Eastern..1931	9,388	4,845	14,233	4.5	16,672	1,992	1,010	40.8	262	10.9	8,345	128	43.1
1930	9,724	7,650	17,374	4.3	13,835	1,936	992	40.4	264	10.8	10,110	158	55.7
Long Island .....1931	745	4,533	5,278	1.3	6,556	883	349	30.1	87	5.5	1,145	327	38.0
1930	755	4,385	5,140	1.5	5,632	763	293	26.1	78	5.6	1,003	473	35.9
Pennsylvania System...1931	240,362	52,356	292,718	5.2	29,636	2,218	984	29.9	346	19.1	9,501	135	49.5
1930	224,813	66,244	291,057	3.4	27,142	2,219	1,013	30.8	421	22.2	11,376	138	55.5
Reading .....1931	36,469	9,853	46,322	3.2	23,430	1,961	957	36.7	378	17.9	12,097	151	55.5
1930	31,241	12,463	43,704	4.0	21,016	1,843	914	36.3	446	21.0	13,413	156	61.9
Pocahontas Region:													
Chesapeake & Ohio.....1931	48,058	7,065	55,123	1.9	39,762	2,982	1,599	45.1	999	40.3	17,672	93	55.4
1930	36,119	11,286	47,405	2.8	36,104	2,851	1,560	45.7	1,401	55.0	21,560	95	71.6
Norfolk & Western.....1931	40,231	5,294	45,525	.8	41,063	2,862	1,497	43.2	730	28.5	14,937	127	51.6
1930	32,171	8,013	40,184	.9	42,833	3,109	1,687	47.0	1,218	44.2	21,945	129	71.4
Southern Region:													
Atlantic Coast Line....1931	28,451	8,492	36,943	5.3	20,964	1,274	431	19.3	272	24.3	1,944	117	50.9
1930	26,613	9,395	36,008	3.8	20,473	1,393	490	19.5	301	25.4	2,100	113	48.8
Central of Georgia.....1931	7,906	2,181	10,087	12.0	19,689	1,265	508	22.2	356	23.6	1,892	140	48.7
1930	5,925	3,005	8,930	6.2	19,393	1,345	538	22.0	483	32.4	2,272	141	54.4
Ill. Cent. (inc. Y. & M. V.)1931	52,454	14,471	66,925	7.3	24,804	1,644	683	27.7	500	29.4	5,008	149	56.4
1930	44,935	18,201	63,136	3.6	22,410	1,667	703	28.7	690	40.0	6,508	154	76.4
Louisville & Nashville...1931	51,280	9,053	60,333	11.2	20,964	1,462	688	33.0	473	24.6	5,412	152	63.4
1930	45,891	12,739	58,630	8.5	19,199	1,470	711	34.0	636	31.7	7,102	160	84.0
Seaboard Air Line.....1931	17,859	6,970	24,829	3.5	20,458	1,427	500	20.8	355	27.9	1,973	136	60.5
1930	16,832	7,780	24,612	3.7	19,580	1,482	540	21.6	413	31.4	2,267	131	63.8
Southern .....1931	55,568	11,051	66,619	13.0	19,784	1,301	512	22.4	312	21.7	3,113	167	42.6
1930	52,680	15,153	67,833	12.2	18,836	1,354	544	22.8	367	25.4	3,732	167	49.7
Northwestern Region:													
Chi. & North Western...1931	54,412	19,980	74,392	7.7	20,465	1,492	577	23.0	277	19.7	2,434	144	44.8
1930	49,450	26,745	76,195	5.5	17,827	1,409	556	23.5	324	22.0	2,921	168	55.9
Chi. Gt. Western.....1931	4,882	3,617	8,499	8.1	30,743	1,959	726	22.7	650	48.2	3,789	132	63.4
1930	4,552	3,617	8,169	4.7	20,634	1,385	542	22.8	706	48.7	3,953	174	102.2
Chi., Milw., St. P. & Pac.1931	63,395	13,585	76,980	2.0	23,503	1,648	664	25.0	374	24.5	2,551	130	51.8
1930	55,270	18,856	74,126	2.8	20,266	1,549	640	25.2	455	29.0	3,003	158	63.8
Chi., St. P., Minn. & Om..1931	2,964	8,654	11,618	6.6	17,146	1,231	502	24.1	353	23.1	2,392	132	52.0
1930	2,705	9,942	12,647	8.1	14,242	1,144	481	25.7	429	27.2	3,149	155	73.9
Great Northern .....1931	43,889	8,081	51,970	4.5	25,137	1,856	837	27.0	338	18.5	2,105	135	35.7
1930	42,320	9,014	51,334	5.0	20,097	1,576	723	26.3	361	19.5	2,220	177	45.6
Minn., St. P. & S. St. M.1931	20,651	2,831	23,482	4.1	18,596	1,338	566	23.4	275	17.5	1,484	112	49.3
1930	19,711	4,278	23,989	3.1	16,510	1,325	561	23.0	329	21.5	1,798	132	62.7
Northern Pacific.....1931	43,218	5,054	48,272	8.5	24,261	1,712	743	24.6	282	16.3	2,108	157	39.3
1930	40,896	5,958	46,854	7.3	21,207	1,552	711	25.5	358	19.2	2,5		

NEWS

(Continued from page 647)

Similar tables with causes, are given for charcoal, matches and nitric acid. Another table shows fires and personal injuries occurring in connection with articles not classed as dangerous but possessing some dangerous characteristics. Included in the appendices are the six accident bulletins which were issued during the year. Of each of these bulletins about 90,000 copies were issued.

Coolidge Timber-Treatment Patents

The Wood Preserving Corporation, Pittsburgh, Pa., has acquired the exclusive license for the treatment of timber with Montan Wax under the Coolidge patents for all territory outside of the New England states.

Reduced Fares in Oregon

The Southern Pacific has established reduced one-way and round trip passenger fares, beginning March 15, which are from 15 to 20 per cent less than the regular fare, from points in northern Oregon to points in the southern part of the state, for a six months' experiment. Stopovers will be permitted.

P. & S. Convention

The annual convention of the Purchases and Stores Division, A. R. A., will be held May 19, 20 and 21 at the Biltmore hotel, Atlanta, Ga., according to an announcement by W. J. Farrell, secretary. The convention will be the first held by the Division in the South and is expected to be especially well attended by officers of railroads in that territory.

Chicago Connections Discontinued

Beginning on March 22, the Northern Pacific's Alaskan and the Great Northern's Oriental Limited are being started from St. Paul, Minn., instead of from Chicago. Heretofore the cars of these trains were taken by the Chicago, Burlington & Quincy out of Chicago at 11:40 a.m. on train No. 45 and into Chicago on trains No. 44 and 52. Under the new arrangement the latter day trains consist entirely of Burlington equipment and coast passengers will transfer at St. Paul.

Opposition to Transfer of N. Y. Barge Canal Withdrawn

The Merchants' Association of New York at a recent meeting of its directors agreed to withdraw its opposition to the second passage this year of the pending Cheney amendment to the New York constitution authorizing the transfer of the New York State Barge Canal to the Federal Government, provided the legislature, before passing the amendment, adopts a resolution stating that in submitting the amendment to the people the legislature does not give either expressed or implied approval to any transfer of the canal system on the terms set forth in the Rivers and Harbors Act of 1930.

In withdrawing the association's opposition to the amendment, the directors,

the announcement of the decision states, acted at the urgent solicitation of the Port of New York Authority and on the basis of a letter received from Governor Roosevelt, stating that in his judgment the amendment itself was so worded as to make impossible a transfer under the terms of the Rivers and Harbors Act.

The Merchants' Association several months ago approved the principle of transferring the canal to the Federal Government and supported the Cheney

Claim State Roads Aren't For Freight

To the Editor: Through the columns of your valuable paper, I, as a citizen and taxpayer, wish to protest against the continued and ever increasing use of our highways for the transportation of freight. These highways were built by taxation for the purpose of giving a good right of way for all the people, a fast and safe method of conveyance for pleasure cars, and for the benefit of the farmer to get his produce to market, and the city dweller to enjoy the open and unobstructed view of the country side.

We now see our highways cluttered with trucks, two and sometimes three trailers attached—veritable freight trains pounding, and eventually smashing, the foundations of these roads; bulky in appearance, mountainous in height, dirty, grimy, like some slimy, unnatural monster in a fair landscape. For the benefit of a few, to the disadvantage of the many, and an injustice and insult to the well being of the state, these conditions are allowed to exist on the plea that weight and oil taxes will overbalance this abuse. But what amount of money would or could be exacted to repay us for the sure, eventual fact of broken down road beds, dangerous cavities, and the obscuring of the countryside by these monsters?

Many of us, through taxation only, and no fault of our own, have to give up our holdings. Are these taxes, so collected, and furnished for good road building, to be put in the discard by the action of these racketeers of our highways, who evidently care not for the other result, when a rebuilding program will come on?

With our system of expending on anticipation and never figuring on the unanticipated and yearly deficits, I would call on every voter of our state to adopt the slogan, "Save Our Highways." Save them from being converted into freight yards and railroad tracks; protect our transportation system from chaos and our state from bankruptcy.

EX-FARMER.

From the Detroit Free Press.

resolution when it was passed for the first time last year. Early this year the Association decided that the Rivers and Harbors Act of 1930, had set up such restrictive provisions that it would be impossible for the State to effect the transfer on any terms fair to itself. The association, therefore, as announced in the *Railway Age* of January 31, page 304, asked Governor Roosevelt and the legislature to hold up further action on the Cheney resolution until the objectionable clause in the Rivers and Harbors Act had been repealed.

Medals For Pennsylvania Heroes

At the regular meeting of the board of directors of the Pennsylvania, at Philadelphia, on March 25, heroic service medals, voted by the directors, were presented to four employees of the road. The recipients were Albert E. Hine, deck hand, Jersey City, N. J.; J. W. Nichols, yard conductor, East St. Louis, Ill.; Carl E. Stamets, freight brakeman, Columbus, Ohio, and M. Sinew, car inspector, Chicago. In the past eight years, the directors of the Pennsylvania have awarded 90 medals of this character.

Barge Line Asks Proportional Rates

The Inland Waterways Corporation has filed with the Interstate Commerce Commission a complaint asking it to require connecting railroads which participate in proportional rates to and from Ohio and Mississippi river gateways to remove from their tariffs the restrictions which limit the application of proportional rates to shipments the entire transportation of which is all-rail, and to permit the application of such rates to and from gateways served by the federal barge line and its connections.

A.R.E.A. Decides on Three-Day Meeting for 1932

The board of direction of the American Railway Engineering Association has selected March 15-16-17 as the dates for its next or 1932 annual convention. By this action the association will return to a three-day convention as heretofore, instead of the two-day meeting, which was scheduled this year as an emergency measure. The National Railway Appliances Association will present its exhibit at the Coliseum as heretofore, opening on Monday, March 14 and closing on Thursday afternoon, March 17.

Protection of the Eyes

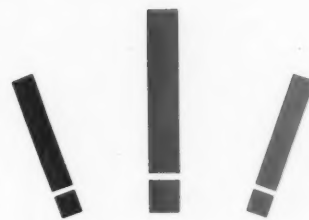
Circular No. 294 containing the recommendations of the Committee on Education, Safety Section, A. R. A., for the month of April, is devoted to an essay on the importance of good vision and on how essential this is as a condition of efficiency and promotion. The circular is illustrated by eight photographic cuts showing different kinds of work where the use of goggles is necessary. Included in these picture lessons are warnings against the danger of eye injuries to trackmen when tamping ties, especially in rock ballast. Another calls attention to the frequency of injuries to eyes among conductors and brakemen from cinders, and

Continued on Next Left Hand Page

YOU CAN'T AFFORD to Wear Out OLD POWER

"Many inefficient locomotives were retired last year and the number of types in use materially reduced. This meant savings in fuel and up-keep. To replace the discarded equipment, locomotives were installed that cut fuel costs at the rate of \$2,000,000 annually.

*—from an annual report of
a large freight carrier.*



- You may have plenty of locomotives to handle all the traffic offered, BUT...
- How economically will these locomotives operate? Locomotives recently built are reducing operating costs by 25% compared with locomotives five to ten years old.
- Consider the subject of locomotives from the economic standpoint. Can you afford to run your present equipment in view of recent locomotive development?



LIMA LOCOMOTIVE WORKS

LIMA

Incorporated

OHIO

(in flat countries) from sand blown in their eyes by high wind. Some trainmen have provided themselves with goggles, not of the best kind. The important thing for them is to have glasses of wide vision and sufficiently close fitting to deflect cinders, sand and dust; and they must be colorless so as not to endanger correct reading of signals.

Less Loss and Damage

Freight loss and damage decreased \$1,193,326 in 1930, as compared with 1929, according to reports made by Class I carriers to the Freight Claim Division of the American Railway Association. In 1930 the total was \$36,239,640; in 1929 it was \$37,432,966.

While the whole account showed a substantial reduction, loss and damage to fresh vegetables and melons increased \$1,424,549. In 1930 the loss and damage to fresh vegetables amounted to \$5,735,582 and to melons \$1,606,896, as compared with \$4,411,945 and \$1,525,984 in 1929.

Rail & Barge via Evansville

Combination rail and barge freight rates from points in Illinois, Wisconsin and Indiana to points on the Mississippi and Missouri rivers via Evansville, Ind., have been established by the Illinois Central, the Chicago & Eastern Illinois and the Cleveland, Cincinnati, Chicago & St. Louis in conjunction with the Mississippi Valley Barge Line and the American Barge Line Company. The fixing of these rates, which are on a parity with the rail-barge rates through St. Louis, and Cairo follows the completion of a \$500,000 terminal and warehouse on the Ohio river at Evansville.

I.C.C. to Investigate Rate-Divisions

An investigation as to the reasonableness of the divisions of joint freight rates between eastern and southern railroads and water lines has been ordered by the Interstate Commerce Commission, according to an order made public on March 24 by the commission, dated as having been adopted on January 3. The proceeding is assigned for hearing on May 11 at Washington before Examiner Hosmer. The order states that the rail and water carriers participating in joint class and commodity rates between points in official territory on the one hand and southern territory on the other hand are in disagreement as to the divisions of such rates.

Department of Justice Considering Rail Price

The Department of Justice, at the instance of Senator Couzens and the Interstate Commerce Commission, is understood to be making an inquiry as to whether there is any situation requiring its attention in the price paid by the railways for steel rails. Senator Couzens has called attention to this matter on several occasions in connection with criticisms of the railways, asking why they have not made efforts to bring down the price paid for rails in view of the reductions in steel prices generally. The Senator finally

"Railroads are transportation companies. They are not permitted to go into the chain-store business, no matter how much profit they might think they could make out of such a venture, but a chain-store company can go into the transportation business. Many of them have gone into it on a large scale. From a central warehouse the company supplies its chain of stores with its own motor trucks, over the public highways, within a radius of one hundred or more miles, instead of shipping its commodities by rail, as heretofore. They cross state lines, pay no license tax in many states into which their trucks are operated, and perhaps buy no gasoline, carrying enough from their base for a round-trip. The private passenger car owner and the farmer with his truck get no direct benefit from such operations, but there is nothing they or the railroads can do about it."

—From the *Baltimore & Ohio Magazine*

wrote a letter to the commission, which turned it over to the Department of Justice.

New England Shippers' Board

The New England Shippers Advisory Board held its regular meeting at Springfield, Mass., on March 19. W. F. Garcelon was re-elected general chairman. A summary of the commodity reports presented at the meeting shows for the second quarter of this year a probable falling off of five per cent in car loadings as compared with the same quarter of 1930. Many of the committees predict no change, and a few predict increases. The principal decreases are boots and shoes, 10 per cent; building stone, 15 per cent; brick and tile, 12½ per cent; fertilizer, 5 to 10; iron and steel, 10 to 15; ice, 20; machinery, 30; potatoes, 12.

Enginemen Ask I.C.C. To Require Mechanical Stokers

Hearings on the complaint filed by the Brotherhood of Locomotive Firemen and Enginemen and the Brotherhood of Locomotive Engineers asking the Interstate Commerce Commission to require that steam locomotives generally be equipped with mechanical stokers were begun at Washington on March 24 before Special Examiner J. L. Rogers. A large number of enginemen from various roads, including many demoted engineers, were on hand to testify and it is expected that the hearing will last for several weeks. Although the complaint was based on the ground that the stokers are required for safety some of the first witnesses who testified mentioned particularly that with stoker-fired locomotives they would be "in shape" to enjoy social affairs in the evening. They had emphasized the arduous work of

hand-firing and averred that on a heavy run their duties with the scoop often interfered with the observance of signals and other duties. Some witnesses expressed the opinion that a ton of coal an hour was a reasonable amount for a man to handle although they spoke of shoveling anywhere from 10 to 26 tons of coal on a run. One witness told of handling 20 to 26 tons of coal on a 140-mile freight run that often ran up to the 16-hour limit but said that now on the same run, with a stoker-fired locomotive, the tonnage is increased and the run is generally completed before overtime begins. He said that after 16 hours of hand-firing he often felt "played out, cooked out and burned out and lucky to get home without help," but that now, after eleven hours on a stoker engine, if the family wishes to go out in the evening he is in shape to go with them.

Status of Bridge Companies To Be Investigated

Naming fifteen railway bridge companies the Interstate Commerce Commission has ordered an investigation as to the application of the provisions of Section 15a of the interstate commerce act, relating to the determination and disposition of excess net railway operating income; and the provisions of section 20a of the act, relating to regulation of security issues, to those companies. Section 15a applies to carriers by railroad or partly by railroad and partly by water, while section 20a applies to any corporation organized for the purpose of engaging in transportation by railroad subject to the act.

American Barge Line Asks to Extend Its Service

The American Barge Line Company, which has been operating on the Ohio and Mississippi rivers between Pittsburgh and New Orleans for several years, has applied to the Interstate Commerce Commission for a certificate authorizing it to operate on these rivers between Glassport, Pa., and New Orleans and also on their tributaries. It desires also to extend its service to the Illinois and Missouri rivers when these are opened for navigation. The company has been operating since 1925 and already has many joint rates and through routes with rail lines. It owns seven boats and 63 barges.

Wage Statistics for 1930

The average number of railway employees in the service of Class I railroads for the year 1930 was 1,510,688, as compared with 1,686,769 in 1929 and 1,680,187 in 1928, according to a consolidation issued by the Interstate Commerce Commission of the monthly summaries of wage statistics issued during the year. For the year, the average, based on the twelve monthly counts as of the middle of each month, was a decrease of 10.44 per cent as compared with 1929. The total compensation for the year was \$2,590,274,843, a decrease of 11.92 per cent. The average straight-time hourly earnings for all employees reported on the hourly basis in-

Continued on Next Left Hand Page



FOR LOWER MAINTENANCE

New C & O Locomotives Use
TANDEM ROD DRIVE

■ LOWER MAINTENANCE was one important consideration in building the Chesapeake and Ohio 2-10-4 type locomotives.

They are doing the work of Mallets and quite naturally will reduce repair costs substantially.

To transmit the tremendous piston thrust of the world's largest two cylinder locomotive, the Tandem Main Rod Drive was incorporated in the design.

Thus the thrust is divided over two driving axles and four outside main crank pins, reducing the work of the main pin and keeping unit bearing pressures within reason.

In this day of "Super-Power", the Tandem Main Rod Drive is an essential to dependable operation and low maintenance.

FRANKLIN RAILWAY SUPPLY COMPANY, Inc.

NEW YORK

ST. LOUIS

CHICAGO

SAN FRANCISCO

MONTREAL

creased from 62.5 to 63.5 cents, and the average straight-time daily earnings of all employees reported on the daily basis increased from \$8.42 to \$8.55. The number of employees in January, 1930, was 1,561,035 and in December it was 1,356,558.

What Is Fair Competition?

A round-table discussion on the subject, "What is fair competition in transportation?" is scheduled as part of the program for the annual meeting of the Chamber of Commerce of the United States to be held at Atlantic City, April 28 to May 1. Questions announced for discussion are: Is there excessive or unfair competition today between various forms of transportation—rail, water, highway, air, pipe line? If so, what are the effects on rates and service? Are they in the public interest? Should government authority seek to equalize competitive conditions? Should competition be restricted? How? Would conditions of competition be made fairer through removal of restrictive regulation?

Railroad Awarded Crossing Accident Damages in Wisconsin

The Chicago & North Western was recently made the recipient by an insurance company of the maximum amount of coverage on railroad property damaged when an automobile was driven into the side of one of its trains at West Elizabeth street, Appleton, Wis., on November 30, 1929. The accident resulted in the death of one of the occupants of the automobile, the serious injury of two others and the derailment of several cars in the train. Suit was brought against the driver of the automobile and the estate of the person who was killed in the accident with the result that settlement was made by the insurance company out of court.

Pennsylvania Contemplates Lake Michigan Ferry Service

The Pennsylvania is considering the establishment of a freight car ferry service across Lake Michigan between Milwaukee, Wis., and Muskegon, Mich., as a means of creating a new and shorter rail line to the east. If the tentative plans are carried out, the Pennsylvania will operate its own ships and will build a ferry dock at Muskegon. At Milwaukee it will probably arrange for the use of municipal facilities under lease.

In conjunction with these plans, the Grand Trunk has arranged to transfer the eastern terminus of its lake ferry lines from Grand Haven, Mich., to Muskegon from which point it will use the trackage rights which it now holds over the Pennsylvania from Muskegon to Grand Rapids. The Grand Haven terminal will be retained for use in emergencies.

Club Meetings

The Car Foremen's Club of Omaha and Council Bluffs will hold its next meeting in Omaha, Nebr., on Thursday, April 9, at 2 p. m. F. M. Rezner, (C. B. & Q.) will present a paper on lubrication of freight

and passenger cars and there will be a discussion on transfer of loaded cars.

The Car Foremen's Association of Chicago will hold its next meeting on Monday evening, April 13, at the Great Northern Hotel, Chicago. J. G. Stewart, general storekeeper of the Chicago, Burlington & Quincy, will present a paper on cooperation between the stores and the car departments.

The New York Railroad Club will hold its next meeting on Friday evening, April 17, at 29 West Thirty-Ninth Street, New York City. G. E. Doke, president of the Association of Manufacturers of Chilled Car Wheels will present a paper on chilled car wheels, with motion pictures and stereopticon slides.

Steamship Line Need Not File Tariffs

The Supreme Court of the United States on March 23 affirmed a decision of the circuit court of appeals for the fourth circuit which had denied a mandamus sought by the federal government, at the request of the Interstate Commerce Commission, to compel the Munson Steamship Line to file schedules covering rates and charges for transportation of goods by water from Baltimore to points in Florida. The government averred that the property was being transported partly by rail and partly by water under a common arrangement for continuous carriage. The court said that the transportation was not covered by through bills of lading or by through or joint rates but that the goods were shipped by rail to Baltimore in care of, or with directions to notify, the steamship company. It was held, in the decision by Chief Justice Hughes, that this did not constitute a "common arrangement" with the railroad for through transportation, as defined in the law. Mere practical continuity in the transportation was not sufficient to maintain the government's contention.

Soil and Water Conservation Tour

Instruction in terracing, to prevent erosion of soil on side hills is the purpose and object of a demonstration train which is traversing the lines of the Fort Worth & Denver City, in Texas; and lectures and field demonstrations are being given in each county along the line in that state. The railway conducts this expedition in cooperation with the Texas Agricultural and Mechanical College and other institutions. This lecture and demonstration course began at Fort Worth on February 17, and is scheduled to end at Lubbock on April 3. Numbers of farms have been practically abandoned in Texas and Oklahoma because of the impoverishment



of the soil by erosion, and the present scheme is expected to produce extensive improvement. The illustration shows a Corsicana Terracer drawn by a Caterpillar tractor.

February Locomotive Shipments

February shipments of railroad locomotives from principal manufacturing plants, based on reports received by the Department of Commerce, totaled 15 locomotives, as compared with 16 in January and 68 in February, 1930. The following table gives the shipments and unfilled orders of locomotives for February 1930 and 1931, the 1930 totals and totals for the first two months of the two years:

Year and Month	Railroad Locomotives Shipments				
	Domestic		Foreign		
	Total	Steam	Elec- tric	Steam	Elec- tric
1931					
February	15	10	5	..	..
Total (2 months) ...	31	20	11	..	..
1930					
February	68	60	5	3	..
Total (2 months) ...	117	108	5	3	1
Total (year) ..	763	706	33	17	7
Unfilled orders, end of February					
	Domestic		Foreign		
	Total	Steam	Elec- tric	Steam	Elec- tric
1931	103	85	7	11	..
1930	536	479	47	8	2

Fuel Performance on the Frisco

The St. Louis-San Francisco reduced its fuel consumption for freight service during January to 167 lb. per 1,000 gross ton miles, as compared with 210 lb. per 1,000 gross ton miles in January, 1930. In passenger service, the fuel consumed in January was 15.6 lb. per passenger car mile, a reduction of 16 per cent, as compared with the same month last year. In switching service the pounds of fuel per switching locomotive mile decreased 7.74 per cent. The saving in fuel for January, 1931, as contrasted with the same month in 1930, is equivalent to approximately 25,000 tons of coal or 500 carloads. During the first month of 1931, the average freight-train load was 1,403 tons, while in January, 1930, it was 1,281.

This performance is a continuation of the results secured for the 12 months of 1930 when the fuel consumed in freight service, 163 lb. per 1,000 gross ton miles, established a new record for the system. The figure for 1930 likewise represented an improvement over 1929 when the amount was 170 lb. per 1,000 gross ton miles. In 1920, the total was 255 lb. per 1,000 gross ton miles. The pounds of fuel per passenger car mile in 1930 totaled 15.2 which was equal to the 1929 performance. In switching service the fuel per locomotive mile averaged 144 lb., equalling the performance for 1929.

DRAFT GEARS.—The various steps in the creation of a Waugh-Gould draft gear, from its design to its banding and shipping, are described briefly in an attractive booklet issued by the Waugh Equipment Company, Depew, N. Y. Half-tone and silhouette illustrations depict the operations.

Continued on Next Left Hand Page

THERE'S MORE TO SECURITY ARCHES THAN JUST BRICK



WHEN 8 ARCH BRICK . . . saved a ton of coal per trip

- FUEL CONSUMPTION on a certain group of locomotives was unsatisfactory.
- Conditions of firing had been altered, but the Locomotive Arch had been left the same.
- Combustion experts of the American Arch Company quickly uncovered the trouble. A change in the Arch design and the addition of eight Arch Brick accomplished a saving of a ton of fuel per trip.
- The locomotive Arch is now and will always be an engineering specialty. For efficient functioning, it must be designed to fit a specific set of conditions. Change the conditions and you affect the efficiency of Arch performance.
- One duty of the engineering service of American Arch Company is to keep locomotive Arches up-to-date. Use this service.

**Harbison-Walker
Refractories Co.**
Refractory Specialists



American Arch Co.
INCORPORATED
*Locomotive Combustion
... Specialists ...*

Foreign

Japanese Railways in 1928-1929

In the fiscal year ending March 31, 1929, the Japanese Government Railways received gross revenues equivalent to \$236,719,152, incurred operating expenses of \$149,872,760, and obtained net revenue of \$113,846,392, according to the official annual report, which was issued somewhat later than usual. Interest charges of \$40,142,520, and other deductions from income, however, reduced the revenue figure to \$67,720,456 as the net profit for the year. The operating ratio was 56.8, compared with 55.7 in the fiscal year 1927-1928.

The figures for revenue, expenses and net profit, as given above for 1928-1929, compare with those for the two preceding years as follows:

	Gross Revenues	Operating Expenses	Net Profit
1928-1929	\$263,719,152	\$149,872,760	\$67,720,456
1927-1928	252,412,018	140,542,796	68,862,741
1926-1927	241,266,945	134,986,157	65,244,188

Private railways of Japan, which included 239 companies operating a total of 3,677 miles of line, reported gross revenues of \$41,106,744, operating expenses of \$22,934,295, and net revenue of \$18,172,449 for the year ending March 31, 1929. These results compare with figures of \$37,228,725, \$20,985,112 and \$16,243,613, respectively, for the fiscal year 1927-1928. The operating ratio for all of these private companies considered as one system, was 55.8 as against 56.4 in the preceding year. Of the 239 private railway companies, 91, with a total length of 946 miles, received governmental subsidies aggregating \$3,181,235.

At the close of the year the Government Railways operated 8,509 miles of line, representing, with equipment, a capital investment of \$1,549,480,150. Transportation service performed included 69,805,073 passenger train miles and 35,437,647 freight train miles, which yielded respectively 13,413,637,023 passenger-miles and 7,810,177,027 net ton-miles. The number of passengers carried was 847,300,471, while the tons of freight handled amounted to 78,506,849. All of these traffic figures represent increases, in most cases of substantial proportions, over corresponding totals for 1927-1928. Of the 4,200 locomotives owned at the end of the year an average of 2,753 were in regular use, with an average daily mileage of 113.9; freight and passenger cars owned on March 31, 1929, totaled 65,986 and 11,179, respectively.

Of the total revenues, \$145,843,994 were derived from passengers or passenger train service, \$113,642,959 from freight transportation, and \$4,232,199 from miscellaneous sources. The largest item of expenditure, accounting for one-third of the total, is listed as "traffic," with transportation expenses sec-

ond, and maintenance of way and equipment third and fourth, respectively. All classes of revenue, and all major classes of expenditure, showed increases over the corresponding figures for 1927-1928.

The report goes on to state that 188 miles of new line were opened to traffic during the year; and that 758 miles were under construction, and 1,965 additional miles of new line authorized, but not begun, at the close of the fiscal period. Net additions to rolling stock, exclusive of locomotives, totaled 2,184 cars. The report also describes efforts to promote passenger travel, both at home and abroad, by means of reduced fares, advertising, etc.; mentions experiments with express freight service for perishables, and lists negotiations for new through traffic arrangements with steamship lines and other railroads for the transportation of passengers and freight between Japan and America, Japan and Manchuria, and Japan and Europe via Siberia. Special traffic arrangements in connection with the Imperial coronation at Kyoto in the fall of 1928 are also given due attention.

Railways of India in 1929-30

Composite gross revenues equivalent to \$423,697,000, operating expenses of \$275,524,000 and net revenue from operations of \$148,173,000 were reported by all railways of India for the year ending March 31, 1930, according to the annual report of the Indian Government Railway Board.

Comparative figures of gross revenues, expenses and net revenues for the past three years are shown in the following table:

	Gross Revenues	Operating Expenses (000 omitted)	Net Revenues
1927-28	\$431,655	\$264,992	\$166,663
1928-29	433,869	272,360	161,508
1929-30	423,697	275,524	148,173

As will be seen from the foregoing, the 1929-30 gross revenues were approximately \$10,000,000 less than those of the previous year. Accompanying this revenue decline was the rise of more than \$3,000,000 in operating expenses, thus bringing about the \$13,000,000 drop in net revenue from operations. In discussing these financial results the report assigns the poorer showing as compared with immediately preceding years to the "depressed state of Indian trade in 1929-30."

Class I railways—those with annual gross revenues of 50,000,000 rupees or \$18,250,000—reported in 1929-30 gross revenues of \$409,266,000 or more than 96 per cent of the total. This represents a decline of approximately \$10,000,000 from the \$419,212,000 in gross revenues reported by Class I roads in 1928-29. At the same time operating expenses of these larger systems rose \$10,000,000 as compared with the previous year so that their 1929-30 net revenue from operations of \$139,833,000 was \$20,000,000 under the comparable 1928-29 figure.

Class II railroads—those with annual gross revenues under 50,000,000 rupees but over 10,000,000 rupees (\$3,650,000)—show a slight increase in gross revenues for 1929-30 as compared with 1928-29. Last year these lines reported gross

revenues of \$12,521,000, operating expenses of \$7,718,000 and net revenues of \$4,803,000 as against 1928-29 gross revenues of \$12,385,000, operating expenses of \$7,289,000 and net revenue of \$5,096,000. Thus it will be seen that, because the increase in operating expenses more than offset it, the increase in gross was not translated into net revenue.

A segregation of state operated and controlled lines shows that these government properties last year reported gross revenue of \$373,988,000, operating expenses of \$252,315,000 and net revenue of \$121,673,000. Comparable 1928-29 figures are: Gross revenues, \$381,639,000; operating expenses, \$241,368,000; net revenue, \$140,271,000.

Passengers carried during the year under review totaled 634,297,400, an increase of about 14,000,000 over 1928-29. The increase was due to the greater number of third class passengers which total rose from 591,742,700 in 1928-29 to 606,467,500 in 1929-30; there was also a slight increase in the number of passengers designated "inter-class," a rating falling between second and third class. First and second class passenger traffic fell off during the year. The net effect of these changes on passenger revenues was an increase of but \$1,239,000 since third class fares average only about six mills per passenger mile.

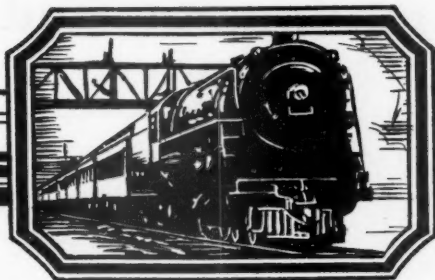
Freight revenues, as compared with 1928-29, declined approximately \$8,500,000 as total long tons of freight handled fell from 90,835,000 to 87,376,000. The average haul per ton of freight increased from 241 to 246.4 miles and the average journey per passenger from 35.6 to 36.3 miles.

Status of German Equipment Industry

Reports for the business year ended June 30, 1930, of three leading Western German railway car manufacturers (Vereinigte Westdeutsche Waggonfabriken A. G., at Cologne-Deutz; Uerdinger Waggonfabrik A. G., at Uerdingen; and Gebr. Schondorf A. G., at Dusseldorf), as summarized by the Department of Commerce, indicate that reorganization and rationalization measures, as well as technical improvements, have brought the plants of these companies to a standard of production which has enabled them to exclude foreign competitors from the German market and to meet successfully the competition by foreign manufacturers in other fields. Though less favorable than for the previous year, financial results during 1929-1930 are also considered satisfactory.

The outstanding feature of the reorganization in Western Germany was the closing down of one of the plants at Cologne and Dusseldorf, so that there would be only one plant operating at each of these places. An agreement between the Westdeutsche Waggonfabriken A. G., Cologne, and the Linke-Hofmann-Busch A. G., Breslau, resulted in the discontinuance of production by the Dusseldorfer Eisenbahnbedarf vormals C. Weyer & Co., at Dusseldorf, a company affiliated with the former concern, and the suspension of operation by the Linke-Hofmann-

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*Alco**Alco*

LOCOMOTIVE MAINTENANCE

AS specialists in locomotive building it necessarily follows that we must be equipped with the organization, shops, and all the special machinery required for producing locomotive parts in quantity.

It also follows that we as builders, when producing these parts, have always in mind the continued success of the locomotive as a whole, thereby insuring a uniformly flawless product.

After a thorough investigation had convinced us that with these facilities we could furnish locomotive parts of quality at a lower figure than their present costs in many railroad shops, we enlarged our facilities so that this production of parts would not be adversely influenced by the receipt of orders for complete locomotives.

With these facts all in mind why not make a careful study of your maintenance requirements with a view of finding out just what locomotive replace parts can be made better and cheaper by us.

In availing yourself of this service you are merely taking advantage of an economy and a convenience, the adoption of which will only serve to emphasize its value.

American Locomotive Company
30 Church Street New York N.Y.

*Alco**Alco*

Busch A. G., at its branch factory at Cologne. The liquidation of the property of the Vereinigte Westdeutsche Waggonfabriken A. G., at Hagen I. W., is reported to have been almost completed at the end of June, 1930.

The companies mentioned above paid dividends as follows: The Vereinigte Westdeutsche Waggonfabriken at Cologne-Deutz, the leading German manufacturer of railway cars, paid a seven per cent dividend from a net profit of 1,277,000 reichsmarks (\$304,181), as compared with 1,006,000 reichsmarks for the previous year, while the dividends paid by the Uerdingen Waggonfabrik A. G. and the Gebr. Schondorf A. G. were 10 per cent, respectively.

Among the technical improvements in the construction of cars, the report of the Uerdingen Waggonfabrik points to the application of the welding process in the place of riveting. This company, according to the statements of its manager, is one of the first German manufacturers to make railway cars for special purposes and was, at the end of December, filling an order for a considerable number of eight-wheel freight cars, each having a capacity of 100 cu. meters (3,530 cu. ft.). A new type of wheel set with a tubular axle, 30 per cent lighter than the ordinary patterns, is also mentioned. The report of the Vereinigte Westdeutsche Waggonfabriken A. G. further states that the present situation and future prospects of the German railway car industry are not entirely favorable due to the present international economic crisis.

"The Bounding Basque"

By a reduction of 42 minutes in the running time of one of its trains, the Midi Railway of France has taken from the Northern of the same country the honor of having the fastest train on the continent of Europe, according to the Railway Gazette (London). Under its new schedule, this train, appropriately named "The Bounding Basque" (Le Basque Bondissant), covers the level stretch of 91.6 miles across the Landes from Dax to Bordeaux (St. Jean station) in 87 minutes, at an average start-to-stop speed of 63.2 m.p.h., about three miles faster than that attained over the same stretch in the opposite direction by the "Sud Express," the schedule of which was recently lengthened out from 89 to 92 minutes.

With important connections from Spain and the Pyrenees resorts, with a connection at Bordeaux with the 5 p.m. Bordeaux-Paris express, and with a through car from Biarritz, the new train, which is electrically operated, is proving popular, although its weight seldom exceeds 335 tons.

For some time prior to the speeding up of the Midi's "Bounding Basque," the fastest train on the continent was the Northern's 12:10 p.m. express from Paris to St. Quentin, which covered 95.6 miles in 92 minutes, at 62.4 m.p.h. The non-stop Paris-Liege expresses run during the Liege Exhibition covered the 147.5 miles from Paris to the Belgian frontier in 142 minutes, at 62.3 m.p.h., but this was not a start-to-stop run.

Equipment and Supplies

LOCOMOTIVES

THE ALBANY (N. Y.) PORT DISTRICT COMMISSION is inquiring for one oil-electric locomotive.

FREIGHT CARS

THE GREAT NORTHERN is inquiring for 250 hopper cars.

THE STANDARD OIL COMPANY OF NEW JERSEY is inquiring for three tank cars of 3,000 gal. capacity.

THE EAST JERSEY RAILROAD & TERMINAL COMPANY has ordered 17 tank cars from the American Car & Foundry Company.

THE HAUSER CONSTRUCTION COMPANY, Portland, Ore., has ordered eight air dump cars of 30 cu. yd. capacity, from the Magor Car Corporation.

THE CHICAGO, SOUTH SHORE & SOUTH BEND has given an order to the Ryan Car Company, for making repairs to five composite gondola cars.

MERCHANTS DESPATCH, INCORPORATED, has given a contract to the Merchants Despatch Transportation Company for the construction of 1,000 steel frame refrigerator cars.

THE L. C. L. CORPORATION has ordered 50 L. C. L. drop side container cars and 300 containers, from the American Car & Foundry Company. These cars are to be placed in service on the New York Central.

IRON & STEEL

THE CHESAPEAKE & OHIO is inquiring for 450 tons of structural steel for a bridge at Walbridge, Ohio.

THE CHICAGO, ROCK ISLAND & PACIFIC is inquiring for 360 tons of structural steel for repairs to a bridge at Davenport, Iowa.

THE NEW YORK CENTRAL is asking for bids until 12 o'clock noon, April 6, for its requirements of steel bars, steel shapes and steel plates.

THE DULUTH, SOUTH SHORE & ATLANTIC has ordered 2,150 tons of structural steel for a new ore dock at Marquette, Mich., from the McClintic-Marshall Company.

THE CINCINNATI UNION TERMINAL has let a contract to the R. C. Mahon Company, Detroit, Mich., for the fabrication of 24,500 tons of structural steel in connection with the new passenger terminal at Cincinnati, Ohio, at a cost of about \$1,500,000.

SIGNALING

THE RUTLAND has contracted with the General Railway Signal Company for the

installation of two interlocking machines at bridges 270 and 276 at South Hero and North Hero, Vt.

THE SOUTHERN PACIFIC has ordered from the Union Switch & Signal Company, material for an automatic interlocking at Orange, Tex., where the line crosses that of the Missouri Pacific.

THE CANADIAN PACIFIC has ordered from the General Railway Signal Company materials for centralized traffic control at Cadorna, Quebec; a 24-lever machine, 35 signals, type SA, and 11 switch machines.

THE KENTUCKY & INDIANA TERMINAL RAILROAD has ordered from the General Railway Signal Company a table interlocker, 11 levers; 10 signals and eight switch machines for installation at Walnut street, Louisville, Ky.

Supply Trade

W. S. Boyce, assistant to the president of the Railroad Supply Company, Chicago, has resigned, effective March 21.

William L. Brown, 1600 Arch street, Philadelphia, Pa., has been appointed special representative in Philadelphia and for Southern territory of the Logan Iron & Steel Company, Burnham, Pa.

O. T. Leavenworth of the railways bureau of the Portland Cement Association of Chicago, has resigned, effective April 1, to become a partner in the National Concrete Machinery Company, Madison, Wis.

L. M. Dunning has been promoted to sales representative of the Chicago office and Herbert A. Holmes to sales representative of the Pittsburgh, Pa. office of The Reliance Electric & Engineering Company, Cleveland, Ohio.

William L. Brown has been appointed special representative of the Argyle Railway Supply Company, Chicago, with headquarters at 1600 Arch street, Philadelphia, Pa., and will handle the sale of stoves and sand driers in that territory.

The Standard Coupler Company, New York, has moved its Chicago office from 120 South La Salle street, to the Strous building, 310 South Michigan avenue. B. W. Brooks is resident representative of the company at Chicago.

The Davis Coal & Supply Company, Reading, Pa., has been appointed distributor in Schuylkill, Berks and Lebanon counties and in part of Lancaster county, Pa., of the products of the General Refractories Company, Philadelphia, Pa.

The Inland Steel Company plans to begin the construction of an addition to its steel mill at Indiana Harbor, Ind., in April. The project, which will cost approximately \$10,000,000, will comprise five buildings housing a 1,000-ft. strip mill.

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IF YOU ARE AIMING AT SAFETY

A sure way to hit the bull's-eye of safety is the use of Carnegie Wrought Steel Wheels. For passenger, engine truck and locomotive tender service, the excellence of Carnegie Multiple-Life Wrought Steel Wheels has long been recognized. And for freight service up to and including 70-ton capacity, Carnegie Light Weight Wheels afford the safety that only wrought steel wheels can assure. Out of Carnegie Wheels are rolled any irregularities that might cause failure.

Into them is forged the stamina to endure the stress of modern heavy-duty, high-speed transportation. If you are aiming at safety, let Carnegie Wrought Steel Wheels help you hit the mark. Our wheel engineers are always at your service



CARNEGIE WROUGHT STEEL WHEELS

Product of Carnegie Steel Company, Pittsburgh, Pa., Subsidiary of United States Steel Corporation

Joseph T. Ryerson & Son, Inc., Chicago, has purchased the good will, patterns and patents for maximillers, production millers and automatic indexing machines heretofore produced by the Kemp Smith Manufacturing Company, Milwaukee, Wis.

The Shepard Niles Crane & Hoist Corporation recently changed its sales office in Pittsburgh, Pa., to the Grant building. Roy M. Hurst, for many years connected with the company and until recently in its New York office, will be in charge as district manager. Frank J. Kinney, who represented the company for many years in the Pittsburgh territory, will be associated with Mr. Hurst at the Pittsburgh office. The corporation has also changed its sales office at Cleveland, Ohio, to 1433 East Twelfth street with Harry A. Baugh in charge as district manager. Mr. Baugh was recently in its Chicago office and for many years served as district manager of the Pittsburgh office. These changes will be effective April 1.

H. W. Renick, vice-president of the Racor Pacific Frog & Switch Company, Los Angeles, Cal., has been elected president to succeed James B. Strong, who becomes vice-chairman and who is also president of the Ramapo Ajax Corporation. After graduating from the University of Denver, Mr. Renick served in the engineering department of the Colorado & Southern and the Union Pacific. In 1910, he entered the employ of the Elliot Frog & Switch Co., and was placed in charge of sales and engineering for the territory west of El Paso, Tex., and Salt Lake City, Utah. In 1916, he was placed in charge of the



H. W. Renick

sales of this company at East St. Louis, Ill., and in 1919 he resigned to become representative of Mudge & Co., the Elliot Frog & Switch Co., and several other railroad supply firms on the Pacific Coast. In October, 1921, he, with his associates, purchased the assets of the Magnetic Signal Company and formed a new corporation of which Mr. Renick was elected vice-president and later president. In 1924, he was also appointed Pacific Coast representative of the Ramapo Ajax Corporation, and when the Ramapo company established the

Racor Works at Los Angeles in 1927, he became vice-president, which position he has held until his recent election.

Pullman Incorporated

The annual report of Pullman Incorporated for the year ending December 31, 1930, shows total earnings from all sources of \$16,943,081, as compared with \$17,678,698 in 1929, after deducting a reserve for federal income taxes. Dividends paid by Pullman Incorporated amounted to \$14,996,139, and the proportion of dividends that the subsidiary, the Pullman Company, paid to minority stockholders totaled \$3,727. The balance to surplus was \$1,943,215, as compared with \$4,160,904 in 1929. The consolidated income account as of December 31, 1930, follows:

	1930	1929
Earnings:		
From carrier business of the Pullman Company, after deducting all expenses incident to operations	\$16,367,206	\$20,765,087
Less: Charges and allowances for depreciation	10,676,129	10,338,488
	\$ 5,691,077	\$10,426,599
From all manufacturing properties and Pullman Railroad, after deducting all expenses incident to operations	12,419,606	7,365,286
Less: Charges and allowances for depreciation	2,373,496	1,203,394
	\$10,046,110*	\$ 6,161,892
From investments, etc.	3,324,424	3,040,652
Total earnings from all sources	\$19,061,611	\$19,629,143
Less: Reserve for federal income tax	2,118,530	1,950,445
Balance of earnings	\$16,943,081	\$17,678,698
Dividends paid:		
By Pullman Incorporated	14,996,139	13,491,831
Proportion of dividends of subsidiary, the Pullman Company, paid to minority stockholders	3,727	25,963
Balance to surplus	\$ 1,943,215	\$ 4,160,904

* Note: 1930 figures include 10 months' earnings from Osgood Bradley Car Corporation and subsidiaries, not represented in 1929.

The statement of David A. Crawford, president, to stockholders, in part, follows:

The outstanding feature of the 1930 results was that the manufacturing subsidiaries con-

tributed \$10,046,109, or more than 59 per cent of the total earnings in 1930 as contrasted with 35 per cent in 1929, and were thus the sustaining factor in the 1930 showing. This was due in part to the inclusion in 1930, for the first time, of earnings from the Standard-Osgood Bradley manufacturing group and in part to a good level of productive activity during most of the year in both of the manufacturing divisions, as contrasted with an abnormally low level of traffic and earnings in the business of the common carrier subsidiary, the Pullman Company.

Good progress has been made in 1930 with integration of the Standard-Osgood Bradley group of manufacturing subsidiaries in the general manufacturing activities of your company. However, these new subsidiaries, as well as the Pullman Car & Manufacturing group, enter 1931 with much smaller bookings than at the beginning of 1930. The heavy decline through 1930 in freight and passenger business of the railroads and the low levels that still prevail in both traffic and earnings resulted during the second half of 1930 in almost complete curtailment of railroad purchases of rolling stock. Your domestic manufacturing subsidiaries are well organized for effective sales and production when there is business to be had.

A separate export unit, Pullman-Standard Car Export Corporation, has been set up to consolidate the handling of the foreign manufacturing subsidiaries and the export activities of the domestic plants. Owing to disturbed world conditions, the 1930 showing of the foreign manufacturing subsidiaries and of export activities from the domestic plants was disappointing. It is hoped that more settled conditions of business, especially in Latin America, will yield improved results in 1931.

The sleeping and parlor car operating business of the common carrier subsidiary, the Pullman Company, experienced in 1930 a country-wide decline in the volume of both commercial and tourist travel, which increased in severity throughout the year. The traffic and operating statistics accompanying this report show that it has not been possible to reduce cars operated and expenses commensurate with the contraction in traffic volume and, as a consequence, the net earnings from the carrier business were off \$4,735,522, or 45 per cent, from 1929. The vital factor of average loading of passengers per car declined in 1930 to 10.57, the lowest point reached in 15 years and over 7 passengers per car below the record loading in 1920. Measured in dollars, the revenue from cars in 1930 was 7.4 per cent below the previous year and 6 per cent below the average for the five preceding years. Notwithstanding the shrinkage in both gross and net in the carrier business, the management has adhered to the policy of adequate maintenance of equipment; the expenditures for that purpose in 1930 were practically on a parity with the 1929 expenditures, and somewhat in excess of the 1928 rate.

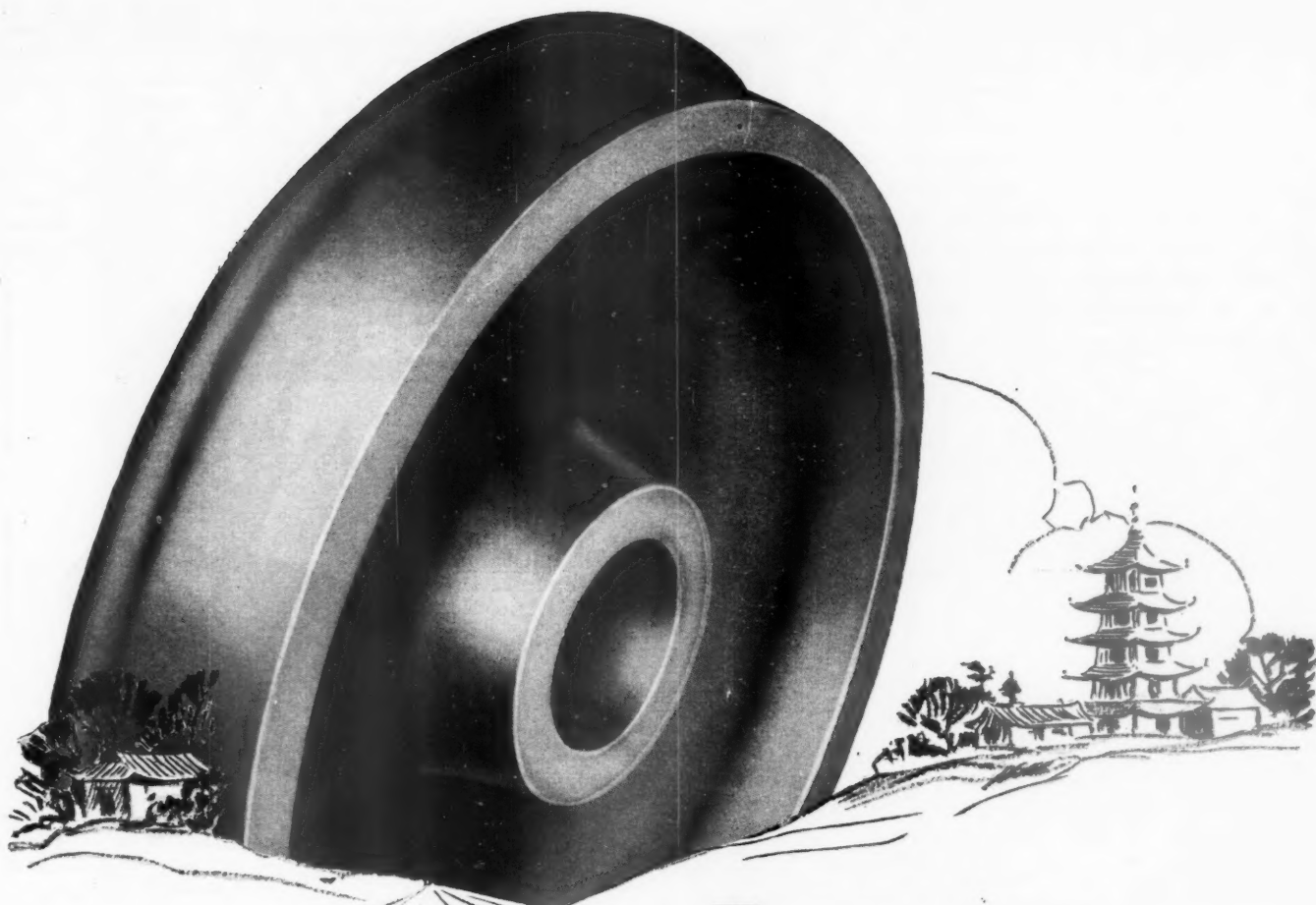
In an effort to increase the revenue from cars, there was introduced in 1930 a new unit in Pullman accommodation, the single occupancy section, carrying a decrease of 22 per cent in the rate previously charged for a whole section regardless of numerical occupancy. As a result of this new rate and of an aggressive sales campaign, the company is now securing from upper berth space previously unsold, new revenue at the rate of approximately \$500,000 a year.

As mentioned in the 1929 report, a period has been reached in the carrier operations when a number of long-term car service contracts with important railroads, made prior to the great change in operating conditions and costs that came in with the war, are now expiring. In the

THE PULLMAN COMPANY—TRAFFIC AND OPERATING STATISTICS COMPARATIVE STATEMENT FOR YEARS ENDED DECEMBER 31

Item	1926	1927	1928	1929	1930
Cars Owned	8,952	9,068	9,248	9,529	9,860
Cars Operated	8,639	8,689	8,631	8,842	8,559
Car Miles	1,112,967,022	1,140,476,049	1,153,889,647	1,206,767,059	1,183,668,557
Revenue passengers:					
Berth	22,658,191	22,042,093	21,310,891	21,008,719	18,498,844
Seat	13,415,020	13,155,085	12,613,029	12,425,549	10,861,342
Total	36,073,211	35,197,178	33,923,920	33,434,268	29,360,186
Revenue Passenger Miles	14,407,455,160	14,096,775,086	13,937,849,095	14,058,525,111	12,515,414,775
Revenue from Cars	\$83,191,087	\$82,250,940	\$82,249,127	\$83,840,812	\$77,666,074
Expenses	\$73,638,331	\$71,891,743	\$71,311,068	\$74,655,613	\$72,729,214
Net Revenue from Cars	\$9,552,756	\$10,359,197	\$10,938,059	\$9,185,199	\$4,936,860
Traffic Averages:					
Average Revenue per Car Operated	\$9,629.94	\$9,466.64	\$9,529.50	\$9,482.32	\$9,074.31
Average Revenue per Passenger	\$2.31	\$2.34	\$2.42	\$2.51	\$2.65
Average Net Revenue per Passenger	\$0.26	\$0.29	\$0.32	\$0.27	\$0.17
Average Net Revenue per Car per Day	\$3.03	\$3.27	\$3.46	\$2.85	\$1.58
Average Mileage per Car Operated	128,834	131,263	133,691	136,484	138,297
Average Journey per Passenger (Miles)	399	401	411	420	426
Average Miles per Car per Day	353	360	365	374	379
Average Loading per Car (Passengers)	12.95	12.36	12.08	11.65	10.57

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Every man to his own taste

The Chinese Mandarin may be content with his own picturesque method of transportation, but the modern world prefers to travel swiftly, smoothly and comfortably on steel rails, and Gary Wrought Steel Wheels.



Illinois Steel Company

Subsidiary of United States Steel Corporation

General Offices: 208 South La Salle Street, Chicago

present period of marked change, particularly in the factor of revenue loading per car, renewals of operating contracts are being made for short terms instead of the terms of 15 or 20 years formerly used in this business. A number of the old long-term contracts have already been revised or renewed on bases reflecting present day conditions, and others are now under negotiation.

During the year, the Pullman Company appropriated \$500,000 for the construction and equipment of a new laundry in Chicago which will be completed and in operation by April, 1931. With this new unit and with the seven laundries previously installed at strategic points around the country, the Pullman Company will have capacity for 335,000 pieces of linen per day in its own laundries, which can be operated with practically continuous maximum load on the company's total laundry requirement of about 800,000 pieces per day.

As a result of the decrease in volume of business in both the carrier and the manufacturing subsidiaries, many regular employees are out of work. Effort has been made to furnish and apportion employment as widely as possible among the various plants, and the subsidiary corporations have, under the authority of your board of directors, undertaken unemployment relief to meet the requirements of the situation. Various associations of employees are conducting, out of their own resources and in co-operation with the local plant managements, measures for the assistance of those now out of employment, to an extent that is most commendable and beyond anything of the kind heretofore undertaken. Measures for continuance of life insurance for the unemployed members of the group plan, by advance of premium costs, have contributed in a very essential way to the stability and usefulness of the group plan.

General Electric Company

The General Electric Company, for the year ending December 31, 1930, reported profit available for dividends of \$57,490,915, or the equivalent, after dividends on special stock, of \$1.90 a share on the 28,845,927 shares of no par value common stock outstanding. The foregoing compares with a 1929 profit of \$67,289,880, equivalent to \$2.24 a share on the common stock.

Orders received during the year amounted to \$341,820,312, or a decrease of 23 per cent from the orders amounting to \$445,802,519 reported for 1929; unfilled orders at the end of the year amounted to \$56,062,000, or a decrease of 41 per cent from the comparable 1929 figure of \$94,623,000. Sales billed for 1930 were \$376,167,428, compared with \$415,338,094 in 1929, a decrease of 9½ per cent. Net income from sales amounted to \$40,450,261, which, compared with \$49,395,896 in 1929, shows a decrease of 18 per cent. These figures for 1930 do not include radio set and tube business, which was transferred to the Radio Corporation of America on January 1, 1930, except that derived from General Electric radios, which were introduced the latter part of the year.

A comparison of income and expenses for 1930 with the previous year follows:

	1930	1929
Net sales billed.....	\$376,167,428	\$415,338,094
Less: Cost of sales, including operating, maintenance and depreciation charges, reserves and provision for all taxes..	335,717,167	365,942,197
Net income from sales	\$40,450,261	\$49,395,897
Income from other sources:		
Associated companies and miscellaneous securities	13,453,654	9,681,387
Interest and discount	3,258,499	3,153,044
U. S. Government securities	1,757,715	3,929,834
Royalties and sundry revenue	1,605,334	4,661,814
	<u>\$20,075,203</u>	<u>\$21,426,080</u>
Total income.....	\$60,525,464	\$70,821,977

	1930	1929
Total income.....	\$60,525,464	\$70,821,977
Less: Interest payments	\$313,079	\$450,807
Addition to general reserve	2,721,470	3,081,290
	<u>\$3,034,549</u>	<u>\$3,532,097</u>
Profit available for dividends	\$57,490,915	\$67,289,880
Less: 6% cash dividends on special stock	2,574,953	2,574,819
Profit available for dividends on common stock	\$54,915,962	\$64,715,061
Less: Regular cash dividends on common stock	46,150,204	32,449,285
Extra cash dividends on common stock..	.....	7,210,949
Surplus for the year...	<u>\$8,765,759</u>	<u>\$25,054,827</u>

OBITUARY

William G. Clyde, who resigned in September, 1930, as president of the Carnegie Steel Company on account of ill health, died at his home in Pittsburgh, Pa., on March 23 at the age of 62. He was born at Chester, Pa., and attended the public schools of Chester, later graduating in 1888 from Pennsylvania Military College. He began work as a civil engineer with Ryan & McDonald, constructors, Baltimore, Md., and later was associated with Robert Wetherall & Company, machinists and founders of Chester. Mr. Clyde began his mill training with the Wellman Steel & Iron Company, Thurlow, Pa., as superintendent



William G. Clyde

of the plate mills. He subsequently was for six years with the Illinois Steel Company, at South Chicago, and then was appointed sales manager of the American Steel Hoop Company, Philadelphia, Pa., remaining in that position until that company was taken over by the Carnegie Steel Company. After serving in sales work for three years at Cleveland, Mr. Clyde was appointed assistant general sales manager of the Carnegie Steel Company, at Pittsburgh, and from March, 1918, he served as vice-president, general manager of sales and a director until his election as president of the same company in November, 1925.

Stanley Hale Bullard, vice-president of The Bullard Company, Bridgeport, Conn., died on March 22 at his home in

Fairfield, Conn., at the age of 53. Mr. Bullard, who had suffered with heart trouble for about a year and was obliged to give up his business and other activities, had apparently recovered and for the past several weeks he had been assuming more actively his former place in the Bullard organization. Mr. Bullard was the son of Edward Payson Bullard, the founder of The Bullard Company and was born on July 4, 1877, at Ho-



Stanley Hale Bullard

boken, N. J. He had been prominent in the machine tool industry as a manufacturer for the past 35 years, together with his four brothers, who, comprising the executive staff of The Bullard Company, followed the business established by their father 51 years ago. After graduating in 1890 from New York Military Academy, he entered the employ of his father as an apprentice machinist, and after completing this period of service, he became connected with the sales work. He first became manager of the New York office of the company, later becoming manager of the eastern sales district, and in 1905 was made general sales manager. In 1915 he was elected a vice-president of The Bullard Company and also became general works manager. Mr. Bullard was an enthusiastic and outstanding factor in the progress of the metal working industry, and besides his many local civic activities, he gave a great deal of his time to civic affairs of national importance and to business in general, and at various times had held offices with many technical and other organizations.

TRADE PUBLICATION

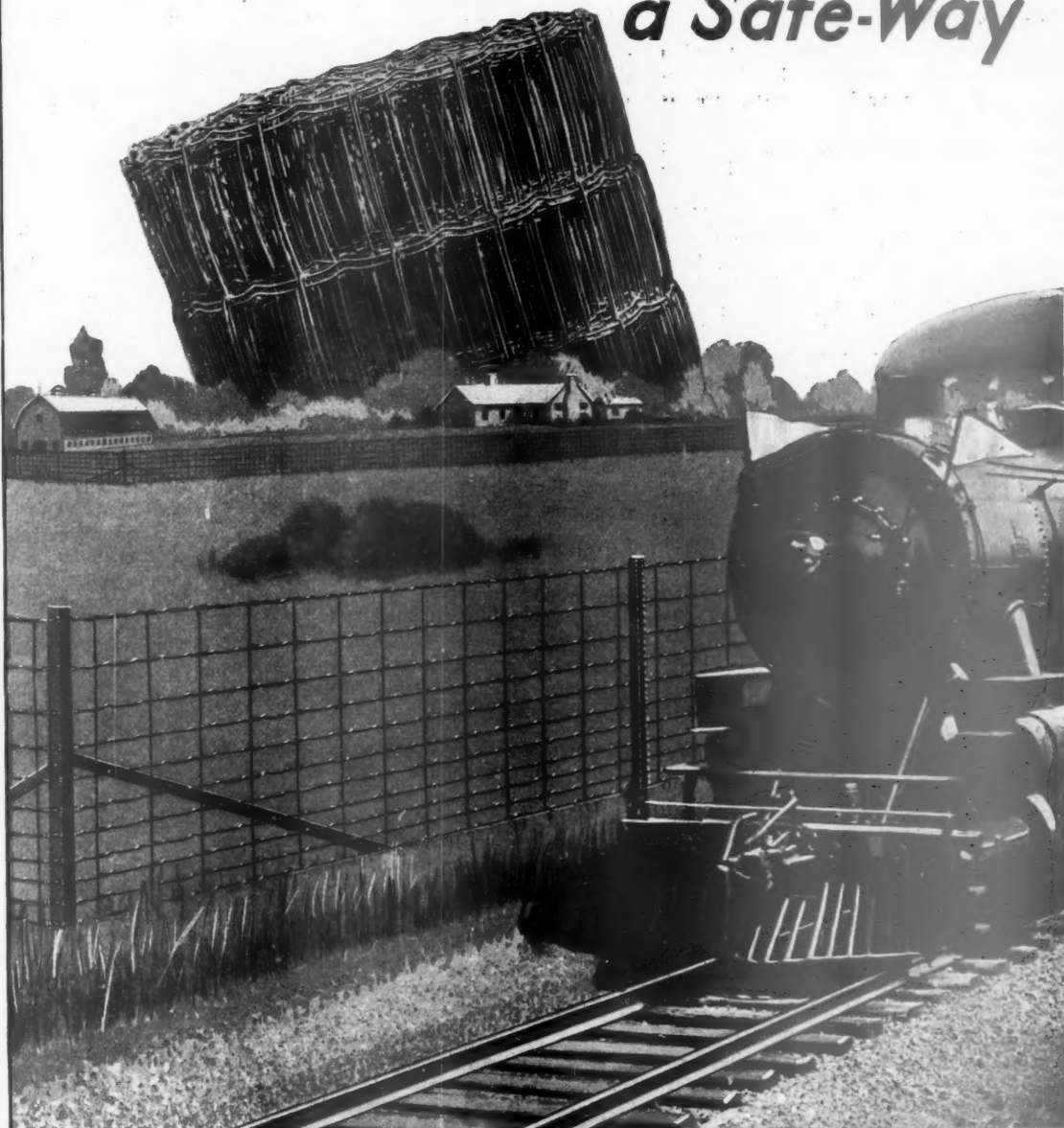
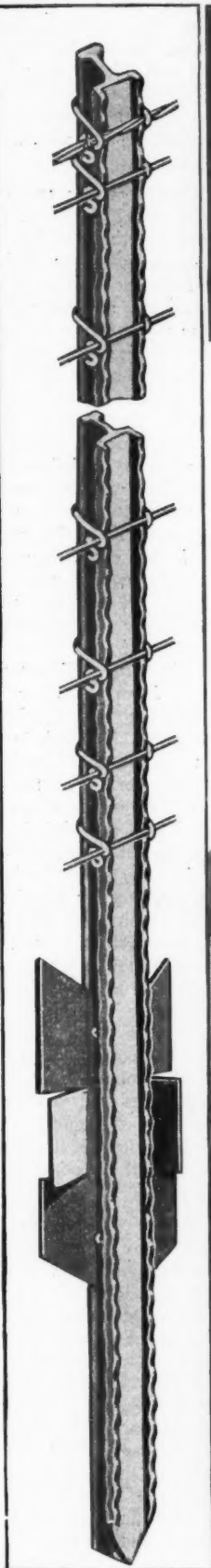
FRICION DRAFT GEARS.—The new Waugh-Gould friction draft gears, Type ST-600, which combine high capacity and long travel in buff, with nominal capacity and short travel in draft, are described and illustrated in an attractive booklet issued by the Waugh Equipment Company, 420 Lexington avenue, New York. These gears are applicable to A.R.A. standard draft pockets, with no changes in striking castings or backstops. The A.R.A. draft pockets are equipped with horizontal yoke attachments.

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AMERICAN Fence and BANNER STEEL POSTS

It is cheaper to put up a good fence than to pay stock claims. Likewise it is economy to buy adequate protection—proved protection—such as that offered by American Railroad Fence and Banner Steel Line Posts—the post of railroad rail construction. These products including National Expanding Anchor End and Corner Posts meet every specification recommended by the American Railway Engineering Association.

Make Your Right-of-Way - - a Safe-Way



1831



1931

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago
Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco

SUBSIDIARY OF UNITED



STATES STEEL CORPORATION

And All Principal Cities

Export Distributors: United States Steel Products Company, New York

Construction

ATCHISON, TOPEKA & SANTA FE.—A contract for the construction of a two-story brick coffee warehouse at Oklahoma City, Okla., has been let to C. M. Dunning, Oklahoma City. A contract has been awarded to the George Senne Construction Company, Topeka, Kan., for the construction of a one-story combined freight and passenger station at Garnett, Kan.

ATCHISON, TOPEKA & SANTA FE (Elkhart & Santa Fe).—Bids will be closed on April 6 for the construction of 59 miles of new line between Felt, Okla., and Clayton, N. M., and between Mt. Dora, N. M., and Gladstone. This construction project contemplates operation over the Colorado & Southern between Clayton and Mt. Dora, 18 miles.

CHESAPEAKE & OHIO.—Construction projects recently authorized by this company, with their probable costs, are as follows: Enlargement and relining of Lakes tunnel, Backbone, Va., \$306,000; construction of tracks at Presque Isle ore dock, Toledo, Ohio, \$162,000; construction of a double track bridge over Main street, Gordonsville, Va., \$105,200; reconstruction of bridge No. 1595, Peru, Ind., \$64,000; installation of a passing track at Terry Junction, W. Va., \$50,000; construction of an undergrade crossing, Midland, Ky., \$31,000; construction of a similar crossing with necessary grade revision, Fishersville, Va., \$29,100, and construction of an overhead crossing, Staunton, Va., \$29,000. Contracts have been awarded to the Waugh Bros. Company, Fayetteville, W. Va., for the construction of a second track and conversion of Popes Nose tunnel into an open cut, between Cotton Hill and Gauley, W. Va., at a cost of \$366,000, and to Langhorne & Langhorne, Huntington, W. Va., for grade crossing elimination work, authorization for which was reported in the *Railway Age* of December 20, 1930, page 1348, at Winchester Pike, Canal Winchester, Ohio, at a cost of \$104,627.

CHICAGO, BURLINGTON & QUINCY.—A contract for the construction of a reinforced concrete viaduct to carry Highway No. 61 over the tracks of this company at Keokuk, Iowa, has been awarded by the Iowa State Highway Commission to the Widell Company, Mankato, Minn. The viaduct will include seven plate girder spans and will involve an expenditure of \$58,000. The cost will be shared by the state and the railroad.

CHICAGO, ROCK ISLAND & PACIFIC—WABASH.—Contracts for completing the viaducts over these railways' tracks at Union boulevard and Grand drive in Forest Park, St. Louis, Mo., including stone railings and paving, have been awarded to the Wabash Stone Company and the Bridges Asphalt Paving Company, St. Louis, by the city Board of Public Service. The total cost of this work, about \$131,000, will be borne by the city and the two railroads.

DULUTH, SOUTH SHORE & ATLANTIC.—A contract for 2,150 tons of structural

steel for a new ore dock at Marquette, Mich., has been awarded to the McClintic-Marshall Company, Pittsburgh, Pa. This dock will involve an expenditure of \$1,800,000 and will have 150 pockets. A contract for complete hoisting equipment for the dock has been let to the Lake Shore Engine Works, Marquette.

GREAT NORTHERN.—To provide for changes in the proposed location of the line to be constructed by this company from Klamath Falls, Ore., south to a connection with the Western Pacific at Bieber, Cal., the Interstate Commerce Commission has amended its original construction order of June 9, 1930. As originally authorized, the proposed Great Northern line roughly paralleled the Alturas branch of the Southern Pacific for 50 miles south of Klamath Falls, while on the new location it will cross the Southern Pacific's main line to San Francisco, Cal., about one mile south of Klamath Falls, from which point it will run parallel to and east of the Alturas branch for 15 miles to Merrill, Ore., thence 10 miles east to a point near the California-Oregon state line at Malin, Ore., thence south, recrossing the Alturas branch, to a point near the original location. The revised line will be about one mile longer and will cost about \$112,000 more than the original line, but will develop more traffic and offer less interference to farm property and irrigation systems.

GULF, COLORADO & SANTA FE.—The general contract for the construction of an 11-story brick, reinforced concrete and steel office building at Galveston, Tex., has been awarded to R. E. McKee, El Paso, Tex. This structure will have dimensions of 76 ft. by 181 ft.

ILLINOIS CENTRAL.—A contract for the construction of the super-structure of a reinforced concrete, steel, brick and hollow tile suburban passenger station at Randolph street, Chicago, has been awarded to Joseph E. Nelson & Sons, Inc., Chicago. The cost of the structure is estimated at \$500,000.

LOUISIANA & ARKANSAS.—Company forces will construct a 2-mile spur track to connect the main line at Shreveport, La., with the War Department Barksdale aviation field. Contracts for furnishing ties and ballast were awarded through the constructing quartermaster at Barksdale field.

MISSOURI-KANSAS-TEXAS.—A contract has been awarded to the James Stewart Corporation, Chicago, for the construction of a 1,054,000-bu. reinforced concrete addition to its grain elevator at Kansas City, Kan., at an estimated cost of \$225,000. This addition will be made up of 17 bins of 25-ft. inside diameter, and 12 outer spaced bins and 4 inner spaced bins. The contract provides for completion of the work by June 10 and includes all equipment.

NEW YORK, CHICAGO & ST. LOUIS.—The Interstate Commerce Commission has authorized this company to abandon a line extending from Maumee, Ohio, to an intersection with the Wabash in Toledo, 5.5 miles, and to construct a new line to

take its place, 6.7 miles long. The purpose of the change is to remove the railway line from a residential district, locating it more suitably. The cost of the new line is estimated at \$1,060,170, of which \$900,000 will be contributed by the municipality as payment for the right-of-way which the railway has abandoned.

PENNSYLVANIA.—Contracts for the excavation of approximately 250,000 cu. yd. of earth, to make way for the foundations of the new Pennsylvania passenger station on the west bank of the Schuylkill river, at Philadelphia, Pa., have been awarded to the Keystone State Corporation. These contracts, calling for the expenditure of more than \$1,500,000, cover the clearing of the station site, excavation preparatory to sinking the station foundations, and the placing of steel and concrete supports for the station structure 60 ft. below the surface. The foundations will be carried on solid concrete piers and steel piles filled with concrete sunk in solid rock through the mud of the old Schuylkill river bed. They will require approximately 15,000 cu. yd. of concrete and 60,000 lin. ft. of steel pipe. Excavation will start just south of the present Thirtieth Street station, and will extend to Market street, and from the river to Thirtieth street. Digging will continue until ground is cleared to the track level of the new station, approximately five feet above high tide in the river. The tracks will pass under the station from north to south at right angles to the high level Thirtieth Street station trackage, which will be used only by electric suburban trains when the main passenger terminal is opened. The present suburban station, known as Thirtieth street, will form the north wing of the new station.

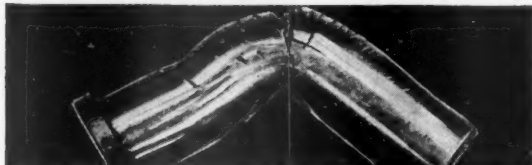
Work will begin as soon as preliminary grading, now under way, is completed. It is expected that the work of excavation will be completed within two and one-half months. Laying of the foundations will require another two months and work on the station will begin by the middle of summer, while it is anticipated that the entire terminal project will be completed in the fall of 1933.

PENNSYLVANIA - NEW YORK CENTRAL - NEW YORK, CHICAGO & ST. LOUIS.—The Public Service Commission of New York has ordered the elimination of grade crossings of the Farnham-Irving State highway with the tracks of two of these three railroads, and the construction of a new underpass at its crossing of the New York Central, near Irving, N. Y. The highway will be carried under the tracks by three underpasses located about 3,000 ft. east of the present crossings, at a total cost of about \$520,000, of which \$265,380 will be borne by the state and the remainder by the railroads and counties.

PITTSBURGH & WEST VIRGINIA.—This company plans the construction of a coal washing plant and tippie at Avella, Pa., in connection with the Pittsburgh Terminal Coal Company, at a cost of about \$500,000.

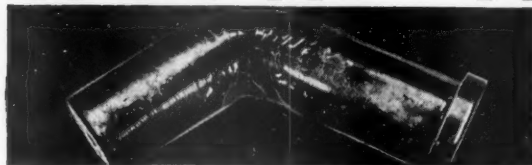
WESTERN PACIFIC CALIFORNIA.—The Interstate Commerce Commission has extended to July 1, 1931, and July 1, 1933, dates for beginning and completion of the line from Redwood City, Cal., to Niles.

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Financial

ATCHISON TOPEKA & SANTA FE.—Control of North Plains & Santa Fe.—The Interstate Commerce Commission has authorized the North Plains & Santa Fe to issue \$500,000 of stock to be sold at par for cash to the Atchison, Topeka & Santa Fe which is thus authorized to control the North Plains line. It will be operated under lease by the Panhandle & Santa Fe.

BOSTON & MAINE.—Annual Report.—The annual report of this company for 1930 shows net income, after interest and other charges, of \$5,727,530, as compared with net income of \$5,993,841 in 1929. Selected items from the Income Statement follow:

	1930	Decrease or Increase
RAILWAY OPERATING REVENUES	\$69,278,335	—\$9,203,102
Maintenance of way..	11,668,430	—2,712,881
Maintenance of equipment	10,213,945	—3,783,778
Transportation	24,999,189	—2,005,733
TOTAL OPERATING EXPENSES	50,865,606	—8,543,336
Operating ratio.....	73.42	—2.28
NET REVENUE FROM OPERATIONS	18,412,729	—659,766
Railway tax accruals..	3,531,795	+35,431
Railway operating income	14,874,103	—694,518
Hire freight cars—Dr.	2,487,721	—295,799
Joint Facility rents..	231,998	+136,695
NET RAILWAY OPERATING INCOME	12,251,159	—391,038
Non-operating income	1,462,576	+41,421
TOTAL INCOME	13,720,503	—358,242
Rent for leased roads	1,138,915	—216
Interest on funded debt	6,338,186	—126,776
TOTAL DEDUCTIONS FROM GROSS INCOME	7,992,973	—91,931
NET INCOME	5,727,530	—266,310
Disposition of net income:		
Income Applied to Sinking Funds.....	174,412	+6,259
Dividend appropriations of income.....	5,891,896	+2,627,333
Balance Transferred to Profit & Loss (Def.)	164,366	.....

* Interest amounting to \$161,291.26 for 1930 and \$158,749.59 for 1929 accrued on bonds held in Sinking Fund is included in account "Income applied to sinking funds."

BALTIMORE & OHIO.—Reduces Common Dividend.—At a meeting of the directors of this company on March 25, the regular quarterly dividend of one per cent on the preferred stock of the company for the three months to March 31, 1931, was declared, payable June 1, 1931, to stockholders of record at the close of business on April 18, 1931. The board also declared a quarterly dividend of one and one-quarter per cent, on the common stock payable June 1, 1931, to stockholders of record at the close of business on April 18, 1931. The customary dividend on common has been on a basis of 7 per cent per annum, now reduced to 5. A statement says: "The Board had before it the statement of earnings for the first quarter of the year, March partly estimated, and while some improvement is indicated in the March earnings over those of the earlier months of the year and conditions generally seem more encouraging, the outlook was not such as in the

opinion of the board would justify the payment at this time of more than one and one-quarter per cent quarterly on the common stock. In taking this action the Board had in mind the desirability of continuing the standards of service and maintenance which have been established, and also of keeping the forces of the Company employed as fully as possible under existing conditions."

LEAVENWORTH & TOPEKA.—Abandonment.—The Interstate Commerce Commission has authorized the abandonment of the entire line of this railroad, 47 miles, extending from Leavenworth, Kan., westerly to Meriden Jct.

MISSOURI-KANSAS-TEXAS.—Final Valuation.—The Interstate Commerce Commission has issued a final valuation report as of 1918 finding the final value for rate-making purposes of the properties affiliated with the Missouri, Kansas & Texas as of that date, used for common-carrier purposes, to be \$144,957,389, including \$5,057,924 for working capital. This is about \$2,000,000 more than the tentative valuation. In the reorganization approximately 500 miles of railroad were taken over by other interests and are not included in the property of the successor corporations. For the latter, on the 1910-1914 price basis, the companies contended for an aggregate value of not less than \$200,000,000, which amount, the commission says, embodies a much smaller pro rata deduction for depreciation than it has made and also includes large amounts for appreciation, excess cost of acquisition of lands, and various intangible items. The books of the M. K. & T. recorded an investment in road and equipment on valuation date of \$172,830,502. If certain readjustments were made as suggested in the tentative valuation, this would become \$121,444,162. The outstanding capitalization on valuation date was \$154,628,674. The final value of the property owned and used by the M. K. & T., on valuation date was placed at \$83,659,000.

NEW YORK CENTRAL.—Abandonment.—Examiner O. D. Weed of the Interstate Commerce Commission has recommended in a proposed report that the commission authorize the abandonment of part of the East Jordan branch of the Michigan Central from Marble, Mich., to East Jordan, 6.5 miles.

NEW YORK CENTRAL.—Bonds.—The Interstate Commerce Commission has authorized this company to issue \$75,000,000 of refunding and improvement 4½ per cent series A bonds maturing in 2013, to be sold at 97¾ to J. P. Morgan & Co., making the average annual cost to the railroad about 4.61 per cent.

NEW YORK, LACKAWANNA & WESTERN.—New Director.—Dwight K. Yerxa, vice-president of the Pillsbury Flour Company, has been elected a director of the above company, which is owned by the Delaware, Lackawanna & Western.

OKLAHOMA, NEW MEXICO & PACIFIC.—Tentative Recapture Report.—The Interstate Commerce Commission has made public a tentative recapture report by Division 1 directing this company to pay

\$427,417, unless a protest is filed by May 4, as representing one-half its excess net railway operating income for the period from 1920 to October 15, 1926, when it was acquired by the Healdton & Santa Fe and became part of the Santa Fe system.

PEARL RIVER VALLEY.—Abandonment.—The Interstate Commerce Commission has authorized this company to abandon the operation, under trackage rights, over a line of railroad extending from Crosby, Miss., to Rowlands, 9.6 miles.

PENNSYLVANIA.—Abandonment.—This company and the West Jersey & Seashore have applied to the Interstate Commerce Commission for authority to abandon 11 miles of the line of the latter between Haddonfield and Medford, N. J.

PERE MARQUETTE.—Bonds.—The Interstate Commerce Commission has authorized this company to issue \$8,000,000 of first mortgage 4½ per cent series C bonds maturing in 1980. The issue is authorized for sale to J. P. Morgan & Co. at 97½ making the average annual cost to the company 4.63 per cent. The company has also been authorized to procure the authentication and delivery of an additional \$6,386,000 of these bonds, such authentication of \$3,072,000 of the bonds being contingent upon cancellation of a like amount of first mortgage 5 per cent series A bonds.

ROSCOE, SNYDER & PACIFIC.—Bonds.—The Interstate Commerce Commission has authorized this company to issue \$400,000 of common stock and \$200,000 of first refunding mortgage bonds to be delivered pro rata to the holders of outstanding common stock and promissory notes in exchange for their holdings.

SOUTHERN PACIFIC.—Bonds.—Kuhn, Loeb & Co. are offering, subject to the approval of the Interstate Commerce Commission, \$50,000,000 of 4½ per cent bonds of this company maturing in 1981. The issue is priced at 96¾ to yield about 4.67 per cent.

WINTER GARDEN BELT.—Charter Filed.—This company has filed a charter with the Texas secretary of state for the construction of a railway from Asherton, Tex., on the Missouri Pacific, through Eagle Pass, on the Southern Pacific, then south through a district which is to be placed under irrigation along the Rio Grande, a total of 70 miles. Directors of the company are W. O. Fitch, A. D. Eidson and M. Riskind, Eagle Pass; T. N. Picnot, E. E. McBrayer and Gilbert R. Taylor, Carrizo Springs; Clifton Fort, J. G. Sullivan and R. W. Taylor, Asherton. Headquarters are at Eagle Pass.

Average Prices of Stocks and of Bonds

	Mar. 24	Last week	Last year
Average price of 20 representative railway stocks..	87.26	85.26	136.78
Average price of 20 representative railway bonds..	93.26	93.48	94.78

Dividends Declared

Chicago Great Western.—Preferred, \$.50, payable April 20 to holders of record April 10.
 Minneapolis St. Paul & Sault Ste. Marie.—Leased Lines.—2 per cent, payable April 1 to holders of record March 20.
 Missouri-Kansas-Texas.—Common Dividend Omitted.

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Better Fires

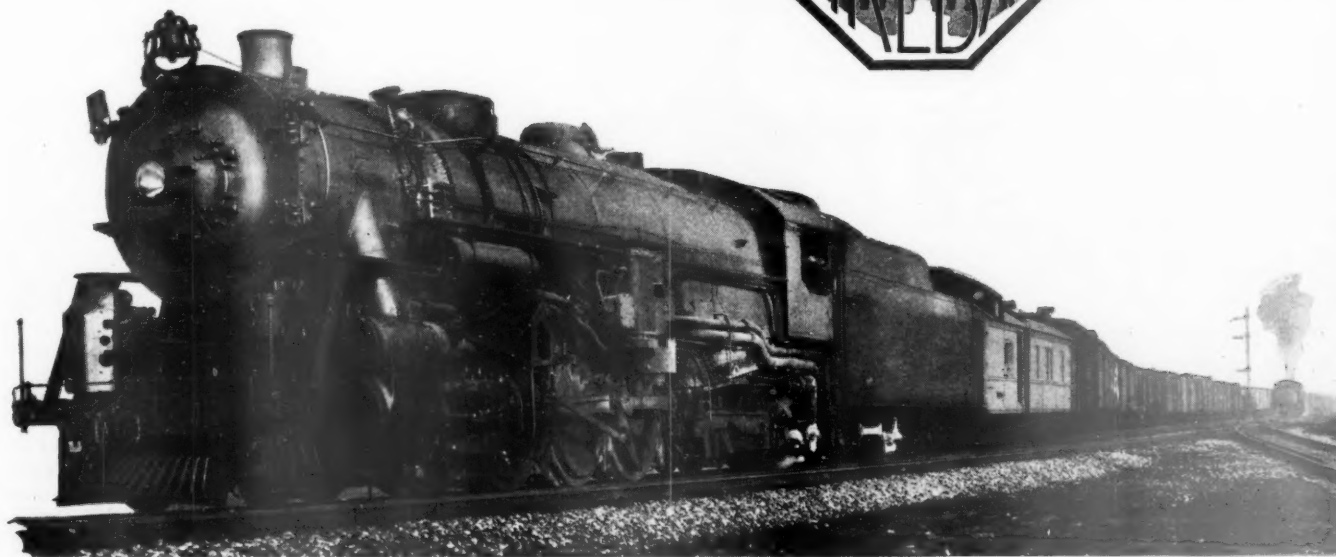
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CLEVELAND

OHIO



Railway Officers

EXECUTIVE

Robert W. Bramwell, recently appointed assistant to vice-president of the Pittsburgh & West Virginia, with headquarters at Pittsburgh, Pa., was born on October 18, 1895, at Toledo, Ohio. He received his education in the local public schools and began his railroad career on July 1, 1916, with the Ann Arbor at Toledo. During the period between July 1, 1921, and May 15, 1922, he held the position of rate clerk in the division freight office of the Cleveland, Cincinnati, Chicago & St. Louis, at Toledo, and on the latter date became associated with the Michigan Central as city freight agent in the office of the general agent. Later he was appointed traveling agent with that road, in which capacity he served for four years. Mr. Bramwell became connected with the Pittsburgh & West Virginia on May 16, 1927, as assistant general agent at Detroit, Mich., and on August 1, 1929, he was promoted to general agent at the same point, the position he held until his recent advancement.

FINANCIAL, LEGAL AND ACCOUNTING

C. H. Reiser has been appointed assistant secretary and assistant treasurer of the Pere Marquette, with headquarters at Detroit, Mich., succeeding **Walter E. Martin**, deceased.

G. W. McElwain, assistant auditor of passenger accounts of the Southern Pacific, has been promoted to auditor of passenger accounts, with headquarters at San Francisco, Cal., succeeding **O. F. Griffin**, who retired under the pension rules of the company on March 1. **A. W. Lawrence**, special accountant, has been promoted to assistant auditor of passenger accounts, to succeed Mr. McElwain.

OPERATING

D. B. James, trainmaster on the Kansas City Southern at Shreveport, La., has been transferred to the First and Second districts, with headquarters at Pittsburg, Kan., succeeding **Tant McDonald**, deceased. Mr. James had been acting trainmaster at Pittsburg for several months prior to the death of Mr. McDonald.

C. C. Peters, has been appointed road foreman-trainmaster of the Wymore division of the Chicago, Burlington & Quincy at Lincoln, Neb. **O. M. Hoenshell**, road foreman of engines on the Lincoln division of the Chicago, Burlington & Quincy, has been appointed road foreman-trainmaster on that division, with headquarters at Lincoln.

James M. Baths, general superintendent of the Chicago Great Western, has been promoted to general manager, with headquarters as before at Chicago, effective April 1. A sketch of Mr. Baths' railway career and a reproduction of his photograph appeared in *Railway Age* on December 21, 1929, page 1456, at the time of his resignation as superintendent of the Peoria & Pekin Union and appointment as general superintendent of the Great Western.

Effective March 15 the Salt Lake division of the Union Pacific System was extended to Daggett, Cal. **A. L. Coey** has been appointed superintendent of that division, with headquarters at Salt Lake City, Utah. **W. H. Smith** has been appointed superintendent of the Los Angeles division with headquarters at Los Angeles, Cal., and **E. E. Cunningham** has been appointed trainmaster of the same division. The maintenance of way department of the Los Angeles division has been combined with the engineering department, under the jurisdiction of **R. L. Adamson**, chief engineer. The position of division engineer, Los Angeles division, has been abolished.

R. F. Finley, who has been appointed general superintendent telegraph and telephone of the New York Central Lines, as announced in *Railway Age* of March 14, page 569, was born on June 30, 1882, at Napierville, Ill. Mr. Finley began his railroad career in January, 1911, as a telegraph and telephone engineer with the Lake Shore & Michigan Southern (now part of the New York Central), at Cleveland, Ohio, and later he was transferred to a similar position at Toledo, Ohio. In October, 1912, he was appointed to serve in the same capacity for the New York Central Lines with headquarters at Chicago, and in December, 1914, he became telegraph and telephone engineer of the New York



R. F. Finley

Central Railroad, lines west of Buffalo, with headquarters at Cleveland. In May, 1916, he was appointed superintendent of telegraph, lines west of Buffalo, and to similar positions on the Chicago River & Indiana, Indiana Harbor Belt and Lake Erie & Western, severing his con-

nection with the latter road in June, 1922.

TRAFFIC

George C. Smith, director for the industrial bureau of the Industrial club of St. Louis (Mo.), has been appointed general traffic manager of the Missouri-Kansas-Texas in charge of freight and passenger traffic and industrial development with headquarters at St. Louis, Mo., effective April 1.

H. R. Wilkinson, general coal agent of the Chicago & Eastern Illinois, has been promoted to general freight agent, with headquarters as before at Chicago, succeeding **F. E. Webster**, deceased. Mr. Wilkinson is a native of Jackson, Tenn., and has been engaged in railway service for more than 20 years. After employment in the traffic departments of the Illinois Central and the Mobile & Ohio at St. Louis, Mo., he was promoted to special traffic representative of the latter road at that point. On July 1, 1928, he was appointed general coal agent of the C. & E. I., his promotion to general freight agent becoming effective on March 16.

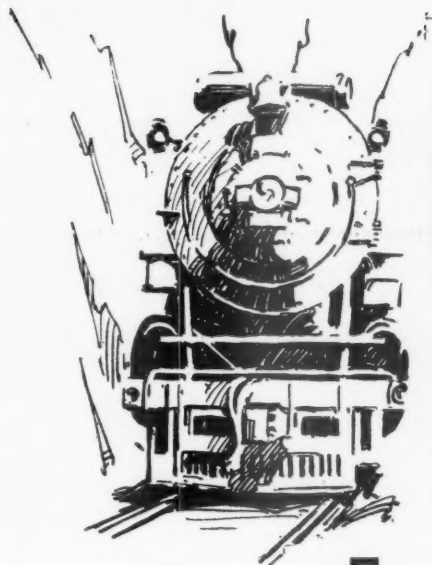
James E. Carter, who has been promoted to assistant traffic manager of the Southern Pacific lines in Texas and Louisiana, with headquarters at Houston, Tex., has been in the service of that railroad for more than 26 years. He was born at New Iberia, La., on August 17,



James E. Carter

1889, and attended high school at that place. At the age of 15 years he gained his first railway experience as a car checker on the Texas & New Orleans. Later Mr. Carter served successively as a telegraph operator, clerk, local freight agent, traveling freight and passenger agent, and traveling auditor. In June, 1918, he was appointed train dispatcher at Lafayette, La., where he remained until March, 1920, when he became assistant general freight and passenger agent at Lake Charles, La. He was appointed assistant general freight agent at Houston on July 1, 1928, his promotion to assistant freight traffic manager becoming effective on February 1.

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W. L. McMorris, recently appointed assistant passenger traffic manager of the Seaboard Air Line, began his railroad career with the Ohio River Railroad at Parkersburg, W. Va., as clerk in the office of the general freight and passenger agent. He served as chief clerk to the district passenger agent of the Pennsylvania at Pittsburgh, Pa., from February 1, 1899 to January 1, 1901, returning to the Ohio River Railroad at Parkersburg on January 1, 1901, as chief clerk, passenger department, and remained with that road until it was sold to the Baltimore & Ohio. Mr. McMorris entered the service of the Seaboard Air Line on August 5, 1905, as traveling passenger agent at Atlanta, Ga. He was promoted on August 15, 1907, to chief clerk, passenger department, Portsmouth, Va., and was advanced to assistant general passenger agent, on July 1, 1917. On March 1, 1920, he became general passenger agent, the position he held until his recent promotion.

ENGINEERING AND SIGNALING

H. R. Davis, division engineer of the Greenville division of the Illinois Central at Greenville, Miss., has been appointed supervisor of track at Harrison, Miss., following the consolidation of the Greenville and Vicksburg Route divisions.

W. G. Powrie, assistant engineer in the office of the general supervisor of bridges and buildings of the Eastern lines of the Chicago, Milwaukee, St. Paul & Pacific at Chicago, has been promoted to division engineer of the Iowa & Southern Minnesota division at Austin, Minn.

MECHANICAL

The headquarters of **D. E. McLean**, master mechanic of the Dauphin division of the Canadian National, have been removed from Kamsack, Sask., to Dauphin, Man.

F. M. Schlicher, assistant master mechanic of the Decatur shops of the Louisville & Nashville at Albany, Ala., has retired under the pension rules of the company.

J. M. Pierce, master mechanic of the Northern division of the Kansas City Southern at Pittsburg, Kan., has been promoted to general master mechanic, with headquarters at the same point, and with supervision over all locomotive repairs on the railroad. **T. D. Saar**, chief locomotive inspector, with headquarters at Pittsburg, has been promoted to master mechanic of the Northern division, succeeding Mr. Pierce. The title of **R. Skidmore**, shop superintendent at Pittsburg, has been changed to master mechanic, with the same duties and headquarters.

Mr. Pierce has been connected with the mechanical department of the Kansas City Southern for more than 22 years. He was born at Paris, Tenn., on

February 7, 1885, and obtained his first railway experience in November, 1908, as a machinist on the Kansas City Southern at Shreveport, La. Six years later he was advanced to roundhouse foreman,



J. M. Pierce

and in 1918 to general foreman at Shreveport. In October, 1922, Mr. Pierce was further promoted to master mechanic at Heavener, Okla., where he remained until November, 1923, when he was transferred to Shreveport. He was transferred to Pittsburg on May 1, 1929, his promotion to general master mechanic becoming effective on February 1.

PURCHASES AND STORES

C. L. Wakeman, chief clerk to the general storekeeper of the Union Pacific Railroad at Omaha, Neb., has been appointed general storekeeper of the Wabash, the Ann Arbor and the Manistique & Lake Superior, with headquarters at St. Louis, Mo., succeeding **H. C. Stevens**, deceased.

MOTOR TRANSPORT

H. C. Lucas has been appointed vice-president and general counsel of the Pacific Greyhound Corporation, Pacific Greyhound Lines, Inc., Pacific Greyhound Lines of Texas, Inc., and California Parlor Car Tours Company, succeeding **Earl A. Bagby**. Mr. Lucas will have headquarters at San Francisco, Cal.

OBITUARY

Charles H. Schneider, district storekeeper on the Chicago, Rock Island & Pacific, with headquarters at Horton, Kan., died at St. Luke's hospital, Chicago, on March 21.

D. R. Carpenter, claim agent of the Tennessee Central for the past 30 years, with headquarters at Nashville, Tenn., died in a hospital in that city on March 14, at the age of 72 years.

Leverett S. Miller, formerly president of the New York, Westchester & Boston, died on March 21 at the age of 65 years. A photograph, and sketch of Mr. Miller's career, appeared in the *Railway*

Age of June 28, 1930, page 1613, at the time of his retirement.

Clement W. Nelson, vice-president of the Arkansas & Louisiana Missouri, the Louisiana & Pine Bluff and a number of other short line railroads, and a former vice-president of the St. Louis Southwestern, died at St. Luke's Hospital, St. Louis, Mo., on March 21, following a breakdown from overwork.

Tant McDonald, trainmaster on the Kansas City Southern at Pittsburg, Kan., died at St. Mary's hospital, Kansas City, Mo., on March 1, after a long illness. Mr. McDonald, who was a native of Derbyshire, England, was 48 years of age and had been in the service of the Kansas City Southern for 23 years.

William A. Kellond, manager of mail, baggage, and express traffic of the Missouri-Kansas-Texas Lines, with headquarters at Parsons, Kan., and Dallas, Tex., died at the Katy hospital at Parsons on March 16, of uremic poisoning, following a major operation. Mr. Kellond was born in Montreal, Que., in 1857. In 1880, he became chief clerk in the law department of the Louisville & Nashville at Nashville, Tenn. He was appointed secretary to the vice-president and general manager of the Katy in 1904, and was promoted to general baggage agent in 1911. Later his jurisdiction was extended and his title was changed to manager of mail, baggage, and express traffic. He was a past president of the American Association of General Baggage Agents, and in 1929 took a prominent part in the government back mail pay case.

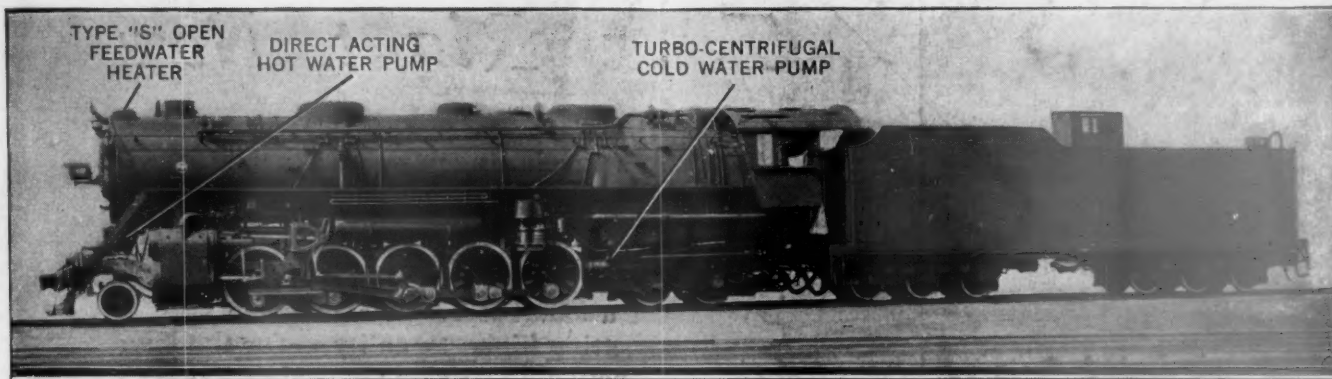
Herman Rettinghouse, former chief engineer of the Chicago, St. Paul, Minneapolis & Omaha, died at Pasadena, Cal., on March 14, of cancer of the stomach. Mr. Rettinghouse was born in Germany on July 30, 1861, and received his academic education in that country. He came to the United States in 1882, and entered railway service in the following year as a rodman on construction of the St. Paul extension of the Wisconsin Central (now the Minneapolis, St. Paul & Sault Ste. Marie). From 1884 until 1912, he served successively as levelman, instrumentman, and assistant engineer on the Milwaukee, Lake Shore & Western (now part of the Chicago & North Western), in a general engineering business and as city engineer at Ashland, Wis., assistant engineer and superintendent of bridges and buildings on the C. & N. W., division engineer on the Wisconsin Central, and division engineer on the C. & N. W. at Boone, Iowa. In April, 1912, he was promoted to superintendent of the Iowa & Minnesota division at Mason City, Iowa, where he remained until November 1, 1913, when he was appointed chief engineer of the Omaha, with headquarters at St. Paul, Minn. Mr. Rettinghouse retired from that position on March 1, 1920, to become a partner in Chenoweth & Rettinghouse, civil and consulting engineers, at Sioux Falls, S. D. For the last few years he had resided in California. He was a past president of the American Railway Bridge and Building Association.

MARCH 28, 1931

TRANSPORTATION LIBRARY

Railway Age

FOUNDED IN 1856



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When a prominent railroad installed a Worthington three-unit type "S" open feedwater heater in 1929, they *looked* for results. The claims made for water and fuel economy were checked by actual road tests. The reliability inherent in the design of the equipment was verified. Increased power and steaming capacity were proved.

After this investigation, the railroad placed orders for additional Worthington heaters, which means... they *found* results.

Bulletin W-220-B2 illustrates Worthington Feedwater Heating Equipment... and covers fully the advantages which you can expect from its use. Send for a copy.

WORTHINGTON PUMP AND MACHINERY CORPORATION

Works: Harrison, N. J. Cincinnati, Ohio Buffalo, N. Y. Holyoke, Mass.


Executive Offices: 2 Park Avenue, New York, N. Y.

GENERAL OFFICES: HARRISON, N. J.

District Sales Offices and Representatives:

ATLANTA	CHICAGO	DALLAS	EL PASO	LOS ANGELES	PHILADELPHIA	ST. PAUL	SEATTLE
BOSTON	CINCINNATI	DENVER	HOUSTON	NEW ORLEANS	PITTSBURGH	SALT LAKE CITY	TULSA
BUFFALO	CLEVELAND	DETROIT	KANSAS CITY	NEW YORK	ST. LOUIS	SAN FRANCISCO	WASHINGTON

Branch Offices or Representatives in Principal Cities of all Foreign Countries



PUMPS
All Sizes... All Types
For All Services
Any Capacity... Any Pressure

COMPRESSORS
Stationary and Portable

CONDENSERS
and Auxiliaries

DIESEL ENGINES

GAS ENGINES

FEEDWATER HEATERS

WATER, OIL and GASOLINE METERS

MULTI-V-DRIVES

ROCK DRILLS

AUTOMATIC HEAT TREATING MACHINES FOR DRILL STEEL

FORGING FURNACES FOR DRILL STEEL

DRILL STEEL

ACCESSORIES

CHROMIUM PLATING

Literature on request

WORTHINGTON



YOUR DOLLAR NEVER BOUGHT MORE TIE VALUE *Than Right Now*

CONTRACT for your ties NOW while the dollar's purchasing power is at a maximum. The policy of buying the best holds true regardless of what part of the economic cycle you are in.

Do not let a small difference in price swerve you from getting highest quality,—for the long life and dependable service assured from quality ties make them least expensive in the end.

Through continued and intensive effort toward efficiency in methods and machinery and through the economies of quantity year-round production, **International** offers tie values never before achieved.

Buying **International** Ties now means a big saving in initial purchase; and the high quality results in lasting economies—a stronger track—safer transportation and fewer annual renewals.

International

CREOSOTING & CONSTRUCTION CO.
PRODUCERS OF HIGH GRADE TREATED TIES
Galveston - Beaumont - Texarkana




This dating nail is your assurance that the tie is a Standard A.R.E.A. Specification Tie.

Full Size
Sound Timber
Properly Seasoned
Scientifically Treated



MINER

RESEARCH LABORATORY



Leadership in
the science of
shock prevention
developed in
this laboratory
has resulted in
the production of

UNEQUALLED
DRAFT
GEARS

W. H. MINER, INC.

CHICAGO

Lewis Special

Process of Manufacture

Made of pure pig iron . . . hand puddled . . . thoroughly worked . . . double refined . . . slab piled . . . crop ends generated . . . sheared after rolling.

Hollow Staybolts

Physical Properties

Tensile strength
48,000 - 52,000 lbs.
. . . yield point
60% of tensile
strength or over
. . . elongation
30% or more
in 8" . . . reduction
48% or
more.

They Last Longer

The pure materials, combined with the special Lewis process assures longer staybolt life. Improved and tested through years of constant development, Lewis Staybolts are as near perfect as it is possible to make them. The long rope-like fibre of this tough, ductile iron offers unusual resistance to the twisting and bending strains set up by the continued buckling of the fire box sheet.

Send for samples of Lewis Special Hollow Staybolts and prove for yourself that they last longer. Furnished headed, threaded, or headed and threaded.

Lewis Special Hollow Staybolts
Conform to A.S.T.M. Spec. A-84-27, Grade A

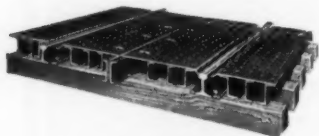
JOSEPH T. RYERSON & SON INC.

PLANTS: Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

REPRESENTATION IN: Minneapolis, Rockford, Kansas City, Tulsa, Houston, Dallas, Newark, New York, Denver, Los Angeles, San Francisco

Ryerson All-Steel Highway Crossing

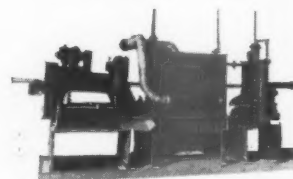
An all-steel highway crossing which combines sturdiness with simplicity of construction. It will withstand the heaviest traffic almost indefinitely. Easily installed; four men can put in an eight-foot section, ready for traffic, in less than half an hour. A smooth, safe crossing which is rapidly gaining prestige with railroad maintenance men. Write for Bulletin giving complete information.



Ryerson Railroad Machinery

Ryerson Flue Shop and Spring Shop Equipment is reducing costs in many large railway shops. Ryerson Machinery also includes rail reclamation plants as well as standard machine tools and metal working equipment of all kinds. Write for catalog and complete information on the equipment in which you are interested.

Sand Blast Flue Cleaner



RYERSON

RAILROAD-SERVICE

for the MIDNIGHT TRICK

The Year Round with Union Electro-Pneumatic Car Retarders

IN every part of the country—day or night—in any weather—in any climate—the year round—"Union" Electro-Pneumatic Car Retarders are speeding the classification of cars in yards and terminals and are affording more efficient service for shippers. For example, in the new westbound classification yard of the Erie at Marion Ohio, (night view illustrated) 3,000 cars can be handled daily under the "Union" Electro-Pneumatic Car Retarder System as against a maximum of 1,629 cars daily under the former method. These retarders enable maintaining a smooth and continuous movement of cars through a terminal or yard; they speed shipments tremendously; they materially reduce accidents and damage to equipment; they minimize labor costs; they make possible savings ranging from 25 to 50 per cent on the investment for new equipment; they pay for themselves in from one to four years. Convince yourself by getting detailed information from our nearest district office.

1881



Union Switch & Signal Co.

SWISSVALE, PA.



1931



A Stores Department loading job. Note similarity to photograph below.

If the **STORES**
DEPARTMENT
can do it, why not

FREIGHT TERMINALS too?

LIKE the stores department, the problem of the freight house is largely *handling*. Yet, many railroads whose stores departments are models of handling efficiency, still tolerate costly and out-of-date methods in their freight terminals.

The problem of picking up, moving and laying down unit loads varies only slightly, whether the commodity is brake beams, steel drums, sardines or toothpicks.

Elwell-Parker Electric Trucks have proved in innumerable installations the most practical, economical and flexible means of handling freight on and off cars. "Paid for themselves in three months," "Earning 150% per year on their original cost," and "Reduced our handling expense 50%," are common reports from terminal officials who have installed Elwell-Parkers. Many of these installations have seen fifteen years service, saving their cost every year, over and over.

Have you ever made a survey of the freight houses of your road, check-



A Freight Department loading job. Note similarity to photograph above.

ing the operations that could be performed at lower cost with Elwell-Parker trucks? Why not make it *now*? Your nearest Elwell-Parker Field Engineer has an intimate knowledge of freight handling conditions. Let him help you make this survey.

It costs you nothing. He will assist

you in preparing an estimate of savings and follow through with drawings and specifications of the proper type and size trucks for you to use. Call this man today—or write to Elwell-Parker, 4250 St. Clair Avenue, Cleveland.

ELWELL-PARKER

Designers and Builders of Electric Industrial Trucks,
Tractors and Cranes for Over a Quarter Century.

Write for This Booklet on Skid Handling. A complete pictorial review of skid operations. What can be handled on skids—and how to handle it. 75 photographs. 16 pages. Sent on request to operating executives.

Now

LIFETIME SECURITY

AGAINST TROUBLESOME STREAMS

Three things are accomplished by enclosing troublesome streams with ARMCO Paved Invert Pipe:

1. Erosion of culvert invert is successfully combated.
2. The service life of the structure is materially lengthened.
3. Safety is assured at lower cost per year.



BASICALLY, ARMCO Paved Invert Pipe is Armco Corrugated Pure Iron Pipe which has an unequalled record to date of 25 years' service under the railroads and highways of the United States and Canada. To successfully combat erosion, the invert of ARMCO Paved Invert Pipe is paved with a tough, resilient, bituminous material which effectively resists the

wear of silt, sand, gravel and boulders.

Now after six years of service tests in "Nature's Laboratory," ARMCO Paved Invert Pipe proves its ability to outlast unprotected drainage structure.

Latest engineering data, explaining in detail laboratory and field tests of ARMCO Paved Invert Pipe, is now available on request.

ARMCO

Paved Invert
PIPE

Armco culverts and drains are manufactured from ARMCO Ingot Iron of the American Rolling Mill Company and always bear its brand.

ARMCO CULVERT MANUFACTURERS ASSOCIATION, Middletown, Ohio



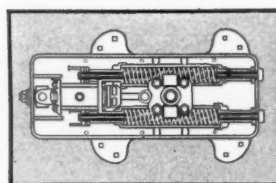
No pounding

with the force
of a 100 pound
sledge when—
the 3-in-1 switch
stand is used

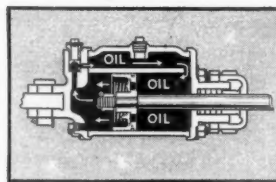
IT'S a fact . . . the Racor 3-in-1 Switch Stand eliminates that terrific pounding which wears and breaks stands, points and wheels by the thousands every year. This elimination of pounding is accomplished by combining in a single unit an automatic double coil spring returning points after trailing train has passed, an oil buffer preventing return of points between successive pairs of wheels, and a rigid throw always ready for hand operation.

It provides a continuous right of way in both directions. A rigidly connected target always shows the exact position of the switch points. With the 3-in-1 there is no necessity to stop trains to operate the switch or the expense of control from a distant tower.

This switch stand is saving thousands of dollars at every location it is used . . . Write today for complete printed information about the 3-in-1.



The automatic double-coil spring returning points after trailing train has passed.



The adjustable oil buffer preventing return between successive pairs of wheels.

The rigid-throw always ready for hand operation. Parts simple and readily accessible for oiling and inspection.

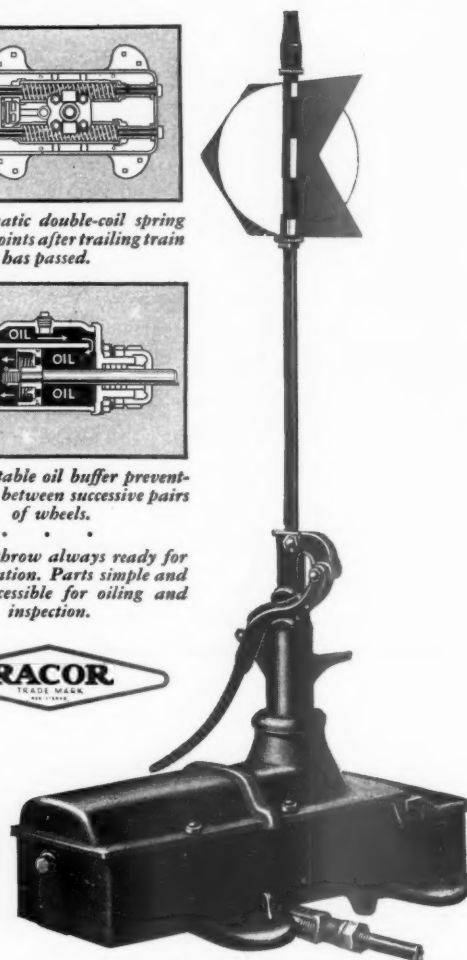


RAMAPO AJAX CORPORATION

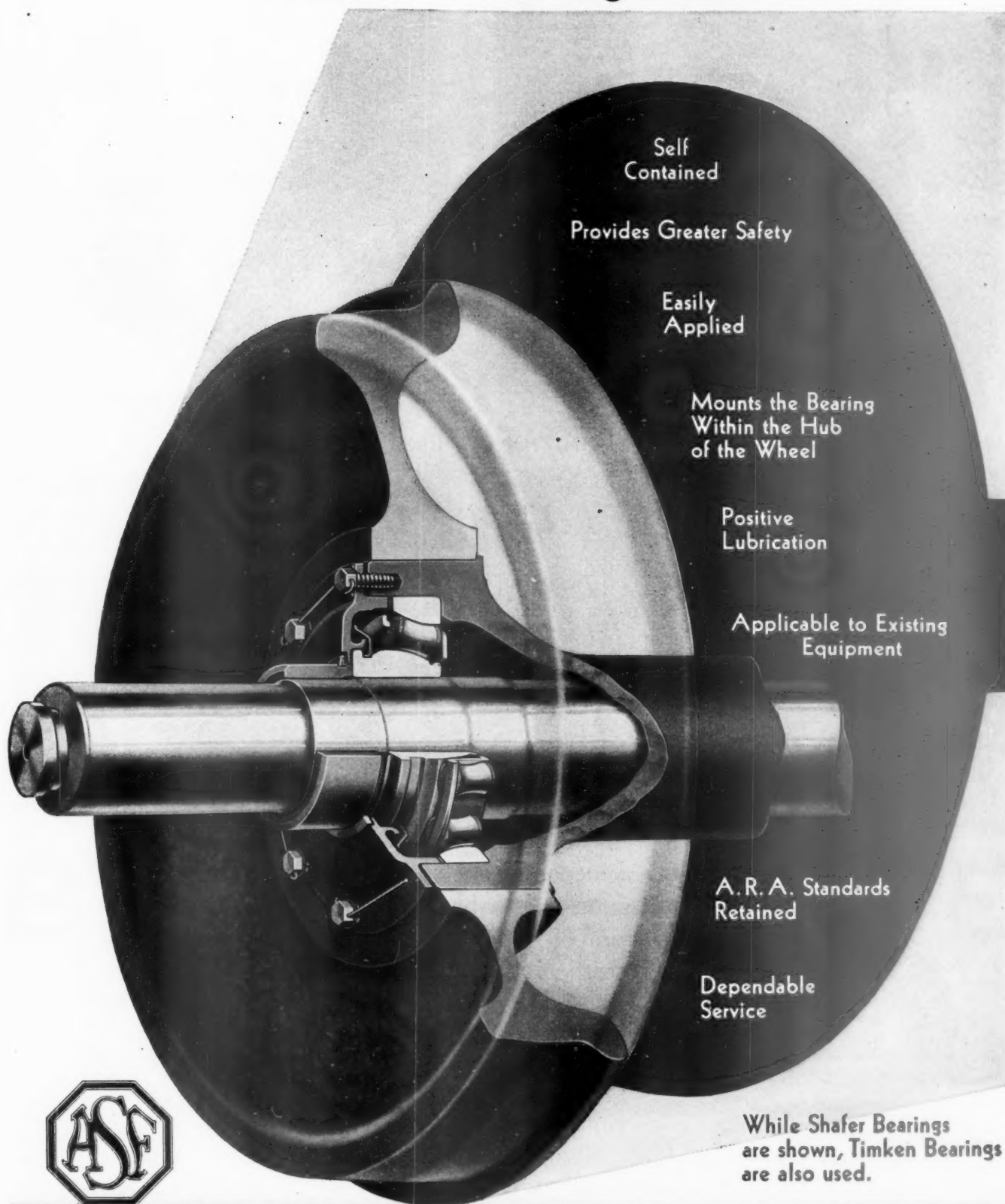
Racor Pacific Frog and Switch Company . . . Los Angeles—Seattle
Canadian Ramapo Iron Works, Limited . . . Niagara Falls, Ontario
General Offices—230 Park Avenue, New York

Sales Offices at Works, and McCormick Bldg., Chicago—Midland Bank Bldg., Cleveland, Ohio
Metropolitan Bank Building, Washington Builders Exchange Building, St. Paul

Nine Racor Works: Hillburn, N. Y., Niagara Falls, N. Y., Chicago, Ill., East St. Louis, Ill.,
Superior, Wis., Pueblo, Col., Los Angeles, Cal., Seattle, Wash., Niagara Falls, Ont.



American Steel Foundries Roller Bearing Unit



Self
Contained

Provides Greater Safety

Easily
Applied

Mounts the Bearing
Within the Hub
of the Wheel

Positive
Lubrication

Applicable to Existing
Equipment

A. R. A. Standards
Retained

Dependable
Service

While Shafer Bearings
are shown, Timken Bearings
are also used.



AMERICAN STEEL FOUNDRIES

NEW YORK

CHICAGO

ST. LOUIS



A MODERN HAULER

*Present-day operating methods
depend upon modern power*

THE drag freight, running extra and frequently spending hours of over-time on the road, has been largely replaced by the scheduled freight, which has time-table rights and often moves at passenger train speeds. In such work the drag freight locomotive is a back-number — it must be replaced by strictly modern power if the traffic is to be handled efficiently and economically.



Up-to-date locomotives that will speed up your freight traffic with a minimum charge for fuel and maintenance, are a profitable investment.

THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

**I ' V E B E E N W O R K I N G
O N T H E
R A I L R O A D**



SINCE 1864 Byers Genuine Wrought-Iron Pipe has been working on the railroads—satisfactorily. Performance records have fixed the places for wrought iron in the “pipe prescription” of most railroads. There is no



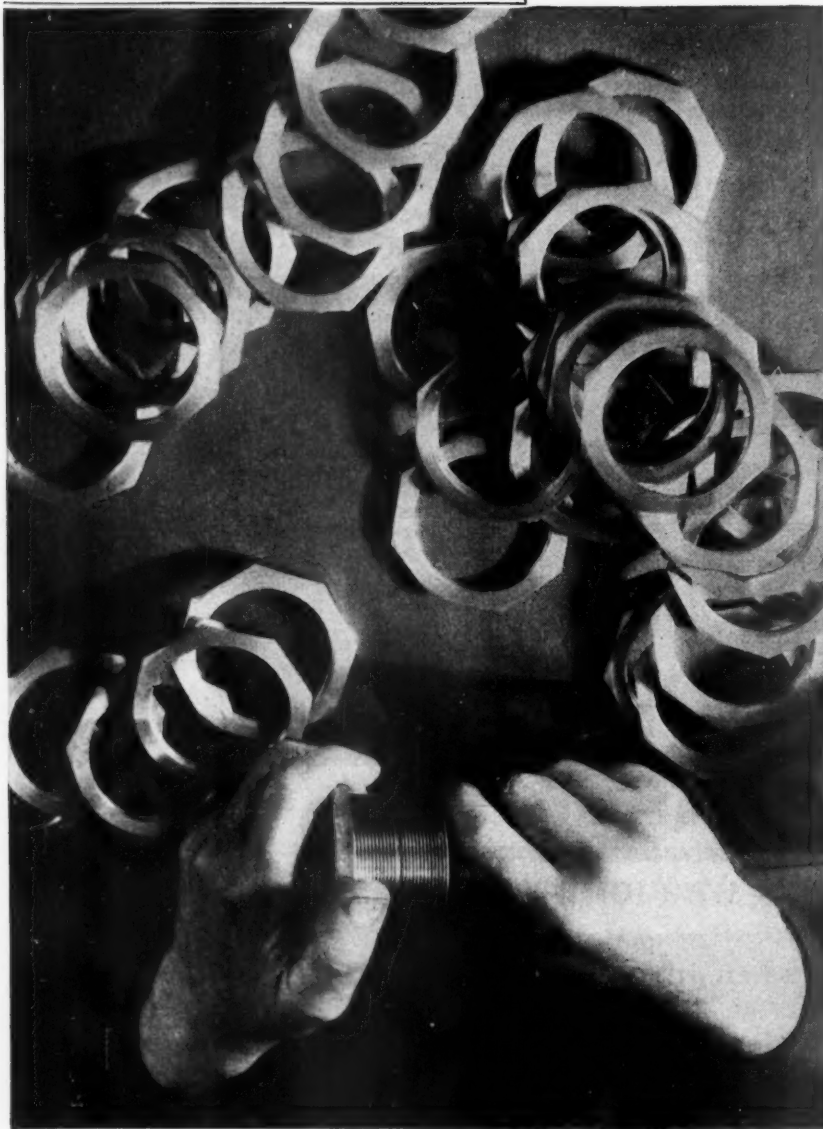
BYERS • GENUINE • PIPE
WROUGHT-IRON

substitute for proven service when it comes to selecting the right kind of pipe for a certain job. The long appreciation of the railroads for the resistance of Byers Genuine Wrought-Iron Pipe to vibration fracture and corrosion is one of the most valued assets of this company. A. M. Byers Company, Pittsburgh, Pa.

A N I N V E S T M E N T -- N O T A N O U T L A Y

How a famous manufacturer saved money with R B & W's

PRECISE TOLERANCES



WHEN a world-famous maker of automotive axles started to purchase from us a nut that must be extremely accurate in size, we received instructions to work to certain tolerances, which left an allowance for lapping to size.

From previous experience, this customer was unable to buy these nuts completely finished to the accuracy and uniformity required, and so had been "lapping out" each nut, a costly procedure, but one which assured the desired result.

After receiving several shipments of nuts from R B & W, made with the lapping allowance, our customer's shop men discovered they were "lapping out" the identical amount from each nut, so closely were we adhering to a definite dimension within the tolerances specified.

Surprised at the uniformity that was being maintained in the R B & W product, the customer finally changed the tolerance specifications to those required in its finished nut, and eliminated the expensive "lapping out" operation in its own plant.

RESULT: Reduced cost of product, with no decrease in quality.

If you have an engineering problem involving the use of bolts and nuts, let us make suggestions based on 86 years of experience in the manufacture of quality products to meet every demand of industry.

RUSSELL, BURDSALL & WARD BOLT & NUT CO.

PORT CHESTER, N.Y.

ROCK FALLS, ILL.

CORAOPOLIS, PA.



*Sales Offices at Philadelphia,
Detroit, Chicago, San
Francisco, Los Angeles,
Seattle, Portland, Ore.*

FIRST

At the turn of the Century, the industrial plant's own maintenance man attempted the dozen and one unusual jobs that developed with amazing regularity.

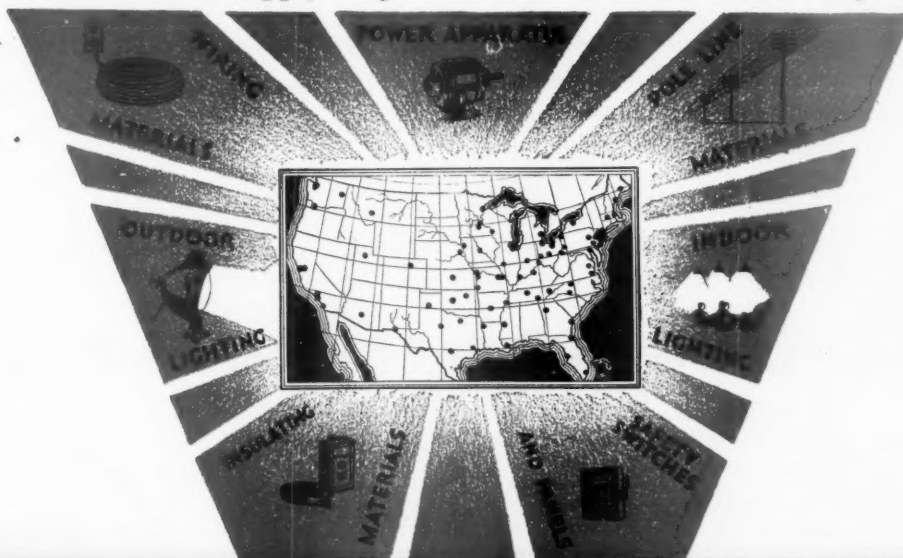
THEN

When the Electrical Age began to hit its stride, the electrical manufacturer's specialist served customers near and far . . . but his territory was scattered, his calls often delayed.

NOW

Industry can obtain promptly the assistance of Specialists in illumination, power-apparatus applications, electrical construction problems, etc. . . . from more than 80 General Electric Supply Corporation warehouses, strategically located throughout the United States.

You can obtain prompt delivery of everything electrical from a General Electric Supply Corporation wholesale warehouse near you.



GENERAL  ELECTRIC
SUPPLY CORPORATION

IN AT THE FINISH!

LONG AFTER less hardy metals have been scrapped . . . after thousands of miles of bumps and jars over crossing frogs and on flat wheels . . . you'll find Reading OLD HICKORY Bar Iron still sound, still serviceable . . . in at the finish!

Insist on getting Reading OLD HICKORY Bar Iron, the railroad iron that is *fibrous* . . . built like a stick of seasoned hickory . . . to absorb vibration and stress. Then you'll know your "power" is safe.



Nick-bend test of Reading OLD HICKORY Bar Iron... Note the fibrous structure

OLD HICKORY Forging Billets

Reading OLD HICKORY Forging Billets are easier to work . . . and parts forged from them have the same resistance to metal fatigue, the same better welding properties, that have made OLD HICKORY Bar Iron famous. Write for complete information.

We Recommend OLD HICKORY Bar Iron for:

STAYBOLTS • • ENGINE BOLTS • • STUD BOLTS
• • SPRING BANDS • • EQUALIZERS • •
DRAW BARS • • COUPLER YOKES • • BRAKE RODS
• HAND RAILS and STEPS • CHAIN • RIVETS •

[[Reading Bar Iron is furnished in the following sizes: Rounds $\frac{1}{2}$ " to $4\frac{1}{2}$ " in diameter. Squares $\frac{1}{2}$ " to 4". Flats 1" x $\frac{1}{4}$ " to 10" x 2". Half rounds $\frac{7}{8}$ " to $1\frac{1}{2}$ ". Hexagons $\frac{5}{8}$ " to $1\frac{3}{4}$ " inclusive.]]

READING IRON COMPANY

READING, PENNSYLVANIA

Atlanta
Baltimore
Boston
Buffalo

Pittsburgh
Cincinnati
Detroit
Houston

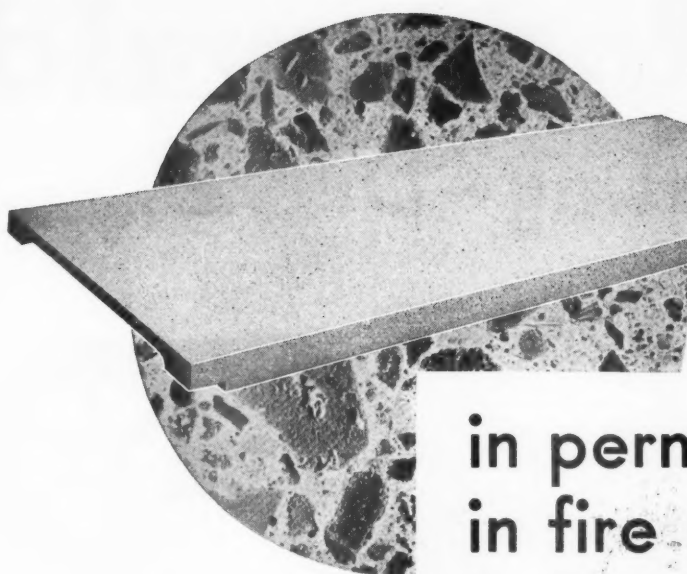
New York
St. Louis
San Francisco
Seattle
Chicago

Philadelphia
Tulsa
Kansas City
Los Angeles

READING

OLD HICKORY BAR IRON





first...

in permanence
in fire safety
in freedom from
all maintenance

Every building must have a roof—but why more than one? Do you replace foundations as the years go on? Then why not use similar material—concrete—for your roof?

Featherweight Concrete **INSULATING ROOF SLABS**

represent the spirit of modern construction—more efficient because lighter (as low as 10 lbs. per sq. ft.)—saving steel tonnage in the super-structure—and with new insulating value.

Haydite, with its trapped air cells, brings these great advantages—a revolutionary development that has made this precast concrete roof-deck superior to all other types of roof construction. Send for complete "Catalog and Roof Standards".

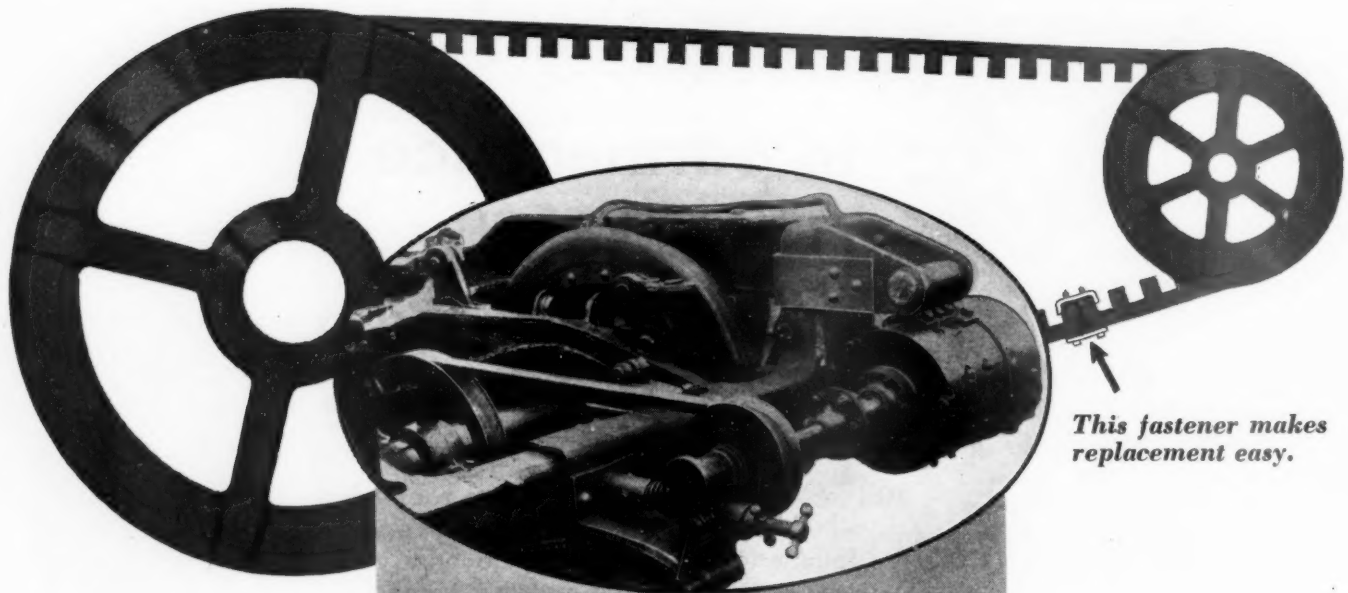
Made, Laid and Guaranteed by

FEDERAL-AMERICAN CEMENT TILE CO.

Executive Offices: 608 South Dearborn Street Chicago
Plants Near CHICAGO . NEW YORK . PITTSBURGH . BIRMINGHAM
FOR OVER A QUARTER CENTURY

Dayton-Roderwald

Axle-Lighting - Drive



This fastener makes replacement easy.

This DRIVE adaptable to Body Hung and Truck Mounted Generators.

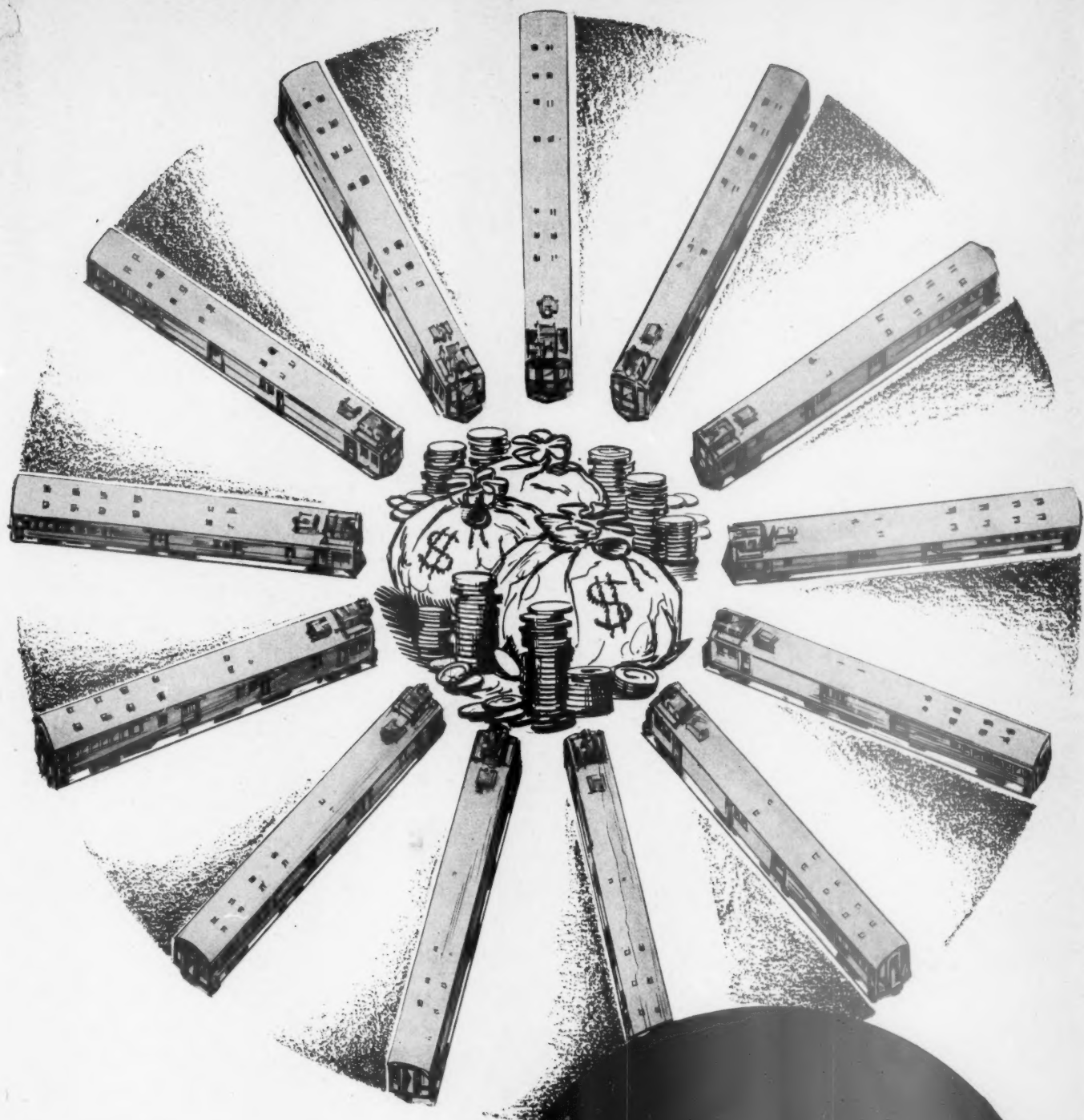
TWELVE PROVEN FEATURES

1. DEPENDABLE
2. EASILY APPLIED
3. POSITIVE CHARGING AT ALL SPEEDS
4. WITHOUT SLIPPAGE EVEN WHEN RUN LOOSE
5. COOL RUNNING, — PRESERVES BEARING LUBRICATION
6. ECONOMICAL
7. PROVEN IN SERVICE
8. IN USE ON OVER 2,000 CARS
9. EASILY MAINTAINED
10. NOT AFFECTED BY ICE AND SNOW
11. LONG LIFE
12. SAFE

Furnished complete with belts, pulleys and necessary accessories.

THE DAYTON — RODERWALD CO.

Subsidiary of The Dayton Rubber Mfg. Co. — World's Largest Manufacturers of V-Belts
DAYTON OHIO





**\$93,597.19 is the
AVERAGE RETURN
FROM EACH OF THE 13
ELECTRO-MOTIVE CARS
ON ONE PROMINENT ROAD***



AMONG the roads operating Electro-Motive Cars is one which put seven Electro-Motive Cars in service in 1925; three more in 1926 and an additional three in 1927.

These thirteen Electro-Motive Cars have covered a total of 3,054,892 miles—an average of 234,992 miles per car.

The estimated cost of steam train operation in this service would be 75c per mile, or a total of \$2,291,169.00.

The average cost of operation per motor-car mile, including fixed charges, for all thirteen cars, has been 35.17c per mile; a total of \$1,074,405.52

By replacing steam operation with Electro-Motive Cars, this road has already saved . . . \$1,216,763.48

Each Electro-Motive Car has thus returned to this road, \$93,597.19—more than twice its cost.

Few things a railroad can buy will pay greater returns than Electro-Motive Cars.

* Name of road on request.



ELECTRO-MOTIVE

Has sold more gas-electric power plants to railroads than all other manufacturers combined.



You Can Solve the Steel Buyer's Eternal Puzzle with INLAND'S aid

In the question marks are reproduced microphotographs of several different grades of Inland Steel... each grade lending itself best to a particular application.

THE applications of steel are innumerable... for washboards and water-towers, for roofing and refrigerators, for structural beams and stovepipe... and through all these countless uses it must differ for best results—now soft, now brittle, now stiff and unyielding, now ductile and workable. Always does a variation in analysis or the method of treating change its suitability for your specific needs.

How then to get the *best* steel for your particular purpose... how

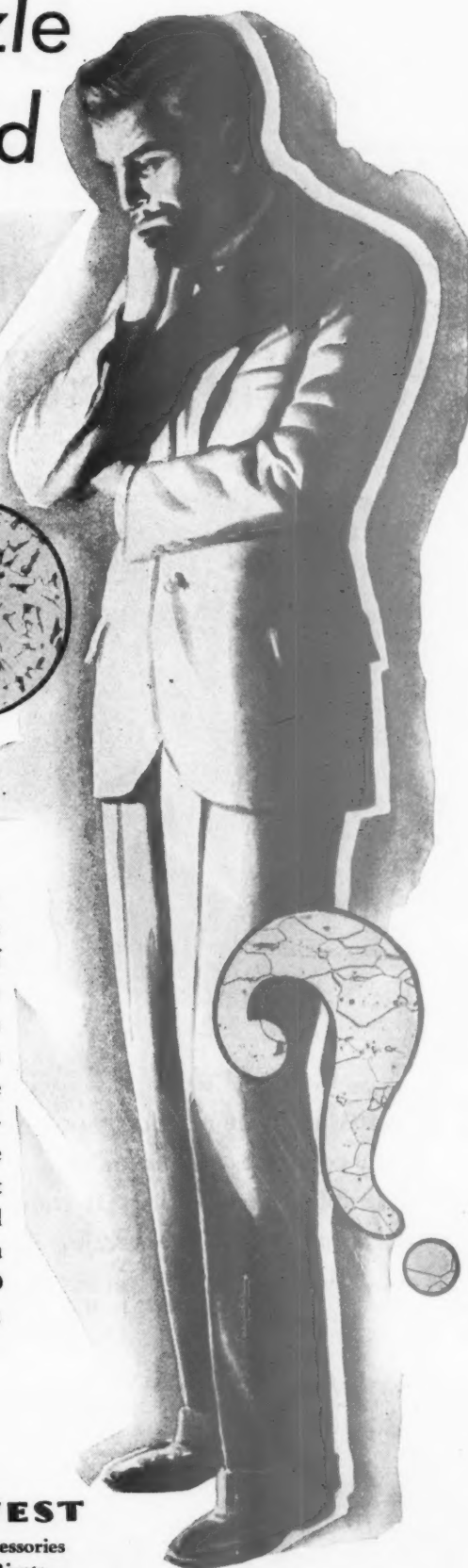
Save with Steel



then to eliminate unsatisfactory guesswork? One sure way is to make use of Inland's 38 years of experience in the making of steel. Inland's skilled metallurgists, Inland's control of processes from the mines to the finished steel, Inland's production facilities, are ample assurance that you will get the steel you need, on time. And Inland will gladly work with you to solve your problem. INLAND STEEL COMPANY, 38 South Dearborn Street, Chicago, Ill.

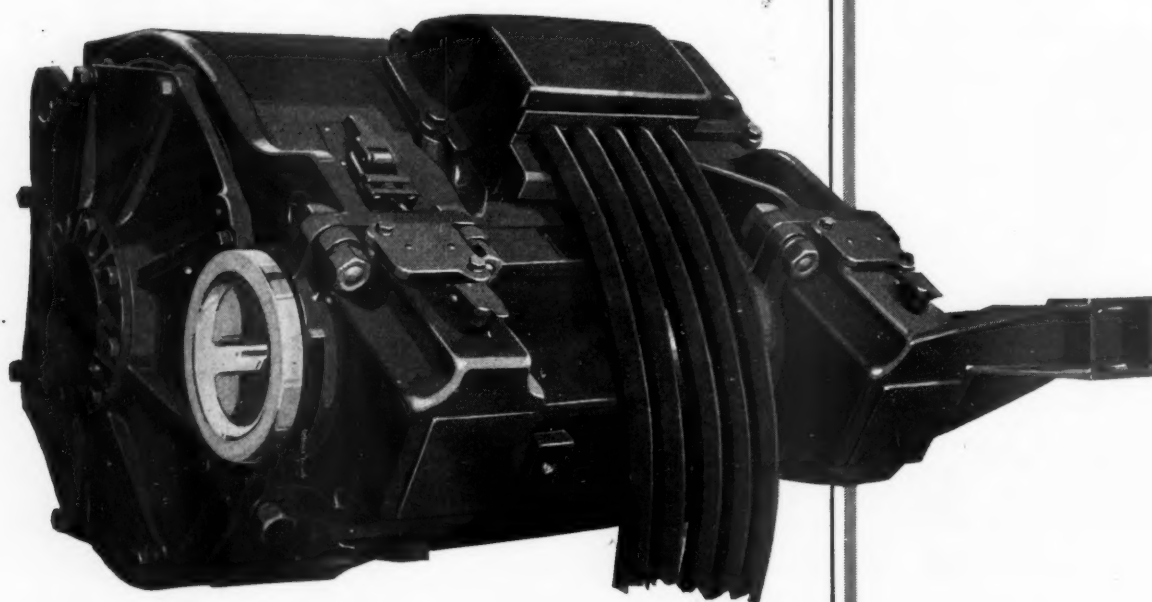
INLAND
ABLE SERVANT OF THE CENTRAL WEST
STEEL

Sheets	Bands	Track Accessories
Bars	Plates	Rails Rivets
Structurals		Billets



New — — Outstanding

*The General Electric
A-c. Traction Motor
for the Reading*



THIS new G-E traction motor for the Reading Company combines—to an unusually high degree—every desirable characteristic. It stands out as one of the most important engineering contributions to railroad electrification in recent years.

Join us in the General Electric program, broadcast every Saturday evening on a nation-wide N.B.C. network

Light weight
Fast acceleration
Sparkless commutation
Long brush life
Long commutator life
High efficiency
High power-factor

GENERAL  ELECTRIC 350-92

CHILLED TREAD WHEEL HISTORY

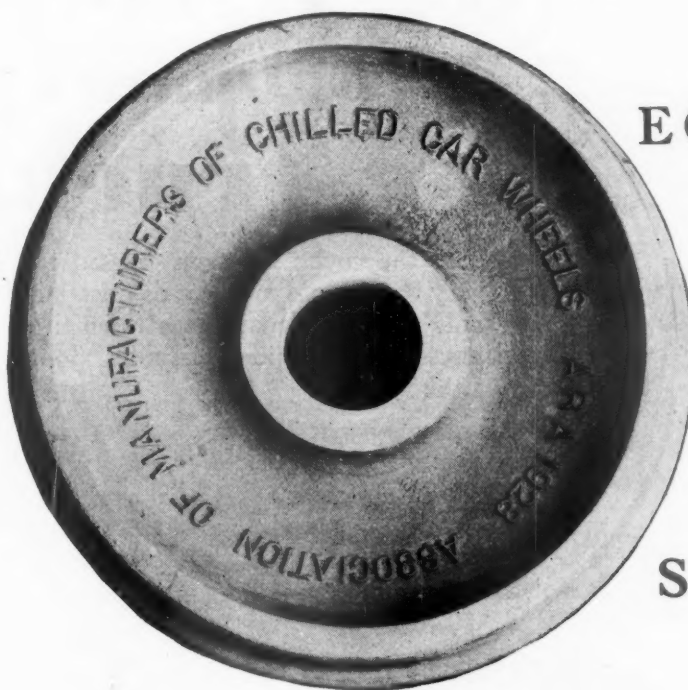
- 1838 —Special designs of **Chilled Tread Wheels** Pat. by Truscott, Wolf and Dougherty—H. R. Dunham.
 1850 —Double Plate Design **Chilled Tread Wheel**—Pat. by Ntl. Washborn.
 1884 —Five Million **Chilled Tread Wheels** in Service.
 1914 —Twenty Million **Chilled Tread Wheels** in Service.
 1917-20—Arch Plate Design Double Plate **Chilled Tread Wheel** adopted as A.R.A. Standard.
 1928 —Single Plate Design **Chilled Tread Wheel** adopted as A.R.A. Standard.
 1930 —Twenty-Four Million **Chilled Tread Wheels** in Service.

The wonderful development of transportation facilities has been made possible by the Chilled Tread Car Wheel.

Better Every Year

A slogan and a fact based upon definite laboratory and foundry programs.

The New Single Plate
 Chilled Tread Wheel
 with re-inforced flange
 Over
 Five million now
 in service with
 an unexcelled
 service record



ECONOMY

SAFETY

SERVICE

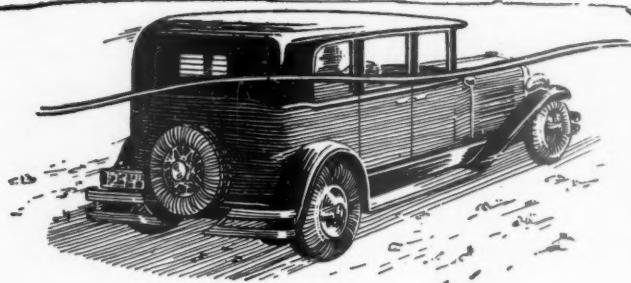
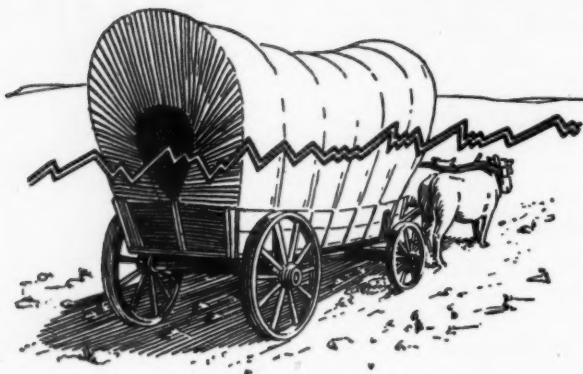
FOR THE 70-TON CAR THE 850-LB. CHILLED TREAD WHEEL—THE HEAVIER THE CAR CAPACITY THE GREATER THE FACTOR OF SAFETY.

CHILLED TREAD WHEELS

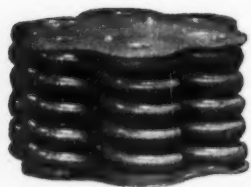
A. R. A. Standards

650-lb. for 30-ton Cars—700-lb. for 40-ton Cars—750-lb. for 50-ton Cars—850-lb. Wheel for 70-ton Cars

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
 1847 McCORMICK BUILDING, CHICAGO, ILLINOIS



Much of This Difference in Riding Quality Has Been Given to Freight Cars by Bettendorf Dalman-Type Trucks



The Dalman spring group which gives Bettendorf Dalman-Type trucks ample reserve spring capacity and unusual shock absorbing ability, can now be furnished in a single cluster as illustrated above if desired.

The Dalman feature adds two standard coils to each spring group.

WHEN the covered wagon crossed the prairies, every stone and every chuck hole meant a distinct jar that brought fatigue to the intrepid souls aboard. Today the balloon tired automobile with scientifically designed spring suspension glides along with little thought to the contour of the road.

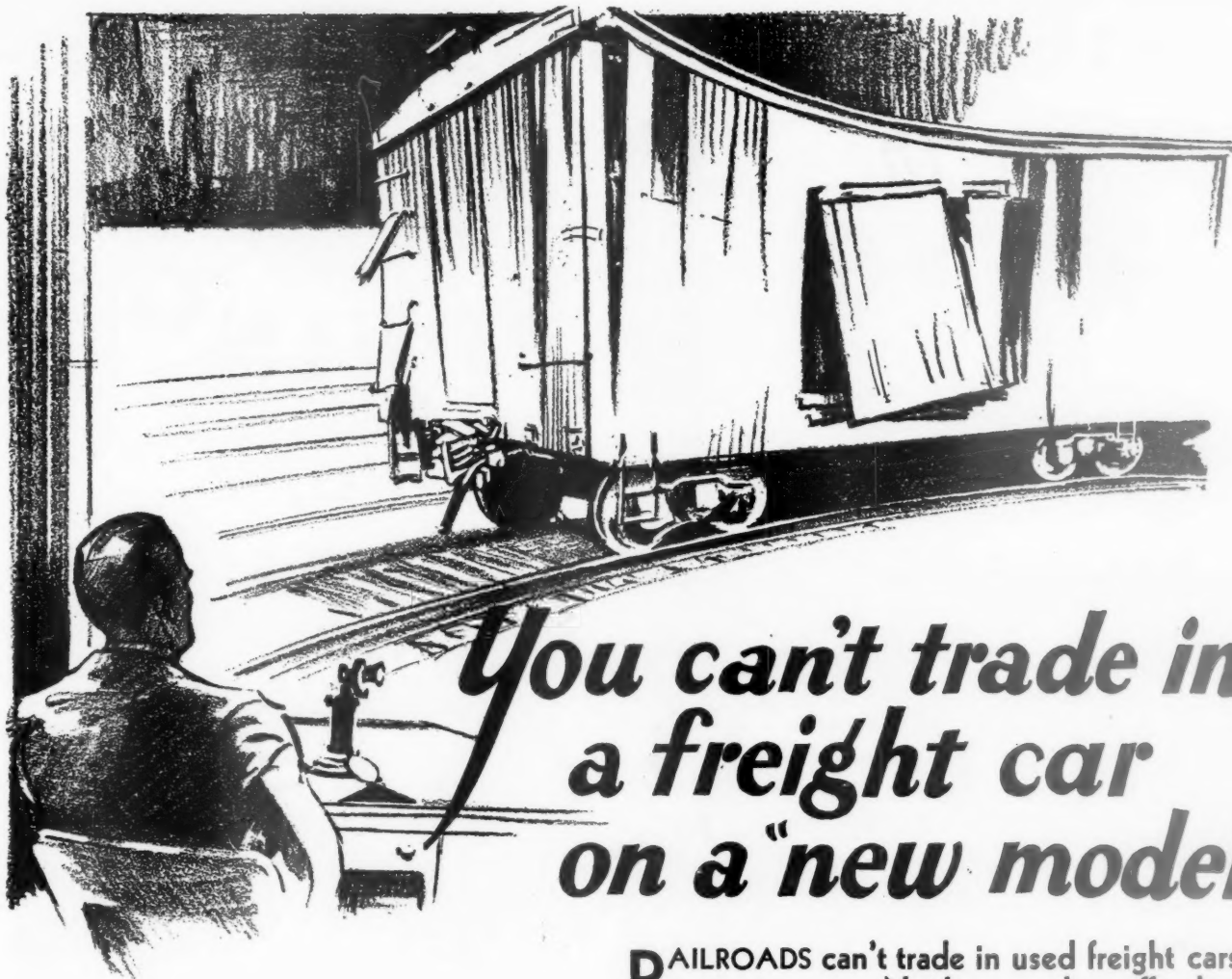
Much of this progress toward perfect roadability has been conferred upon the freight car by that highest development of freight car truck, the Bettendorf Dalman-Type. Your rolling stock is at its best when cushioned by the generous, scientifically arranged Dalman spring group. The economies inherent in the use of this improved equipment are obvious and considerable.



THE BETTENDORF COMPANY

OFFICES AND WORKS

BETTENDORF, IOWA



You can't trade in a freight car on a "new model"

RAILROADS can't trade in used freight cars on new ones. Neither can they afford to discard freight cars after three or four years and replace them with the modern, newer, stronger, heavier cars.

Give these lighter cars the increased protection they need by replacing inadequate draft gears with Cardwell or Westinghouse Draft Gears.

CARDWELL WESTINGHOUSE CO.

332 S. Michigan Avenue, Chicago, Ill.

PITTSBURGH, PENNSYLVANIA
MONTREAL, QUEBEC, CANADA

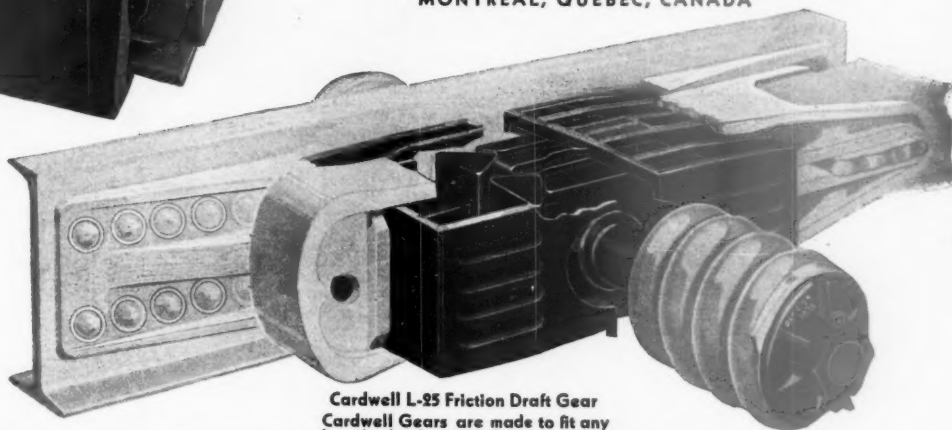


Westinghouse NY-11-D
Friction Draft Gear

Westinghouse Draft Gears can be applied with any type of attachments.

Cardwell and Westinghouse
Draft Gears

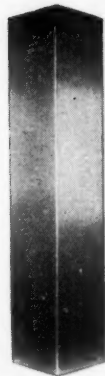
Are made in sizes and capacities to meet all modern and A. R. A. requirements for locomotives, freight and passenger cars.



Cardwell L-25 Friction Draft Gear
Cardwell Gears are made to fit any length of yoke or draft gear pocket.

GOOD DRAFT GEARS MAKE CARS GO FARTHER

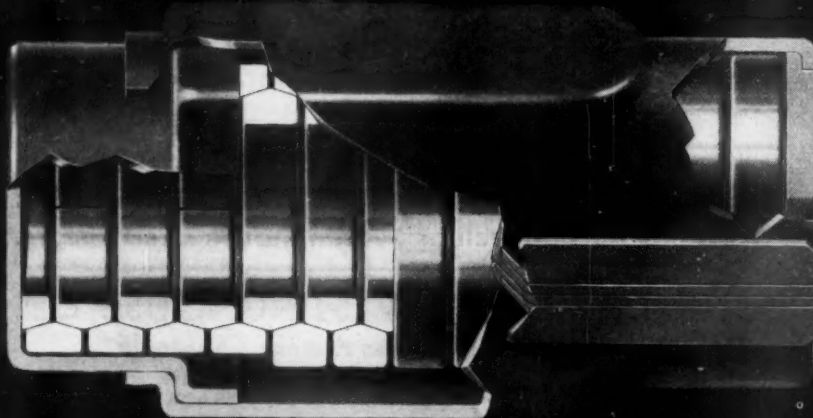
It's the
RING



SPRING
principle



that "makes" the
EDGEWATER
RING SPRING DRAFT GEAR



Simple—yet ruggedly strong—
the Edgewater Ring Spring
Draft Gear performs in a class
by itself. All of those desired
qualities—Uniformity, En-
durance and Capacity are
found in this better unit.
Ask for Bulletin No. 8.

**EDGEWATER STEEL
COMPANY**
PITTSBURGH, PENNA.

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*"Equipment PROTECTION
not heretofore possible"*

"RIDING ON VELVET" . . . *by Chase*

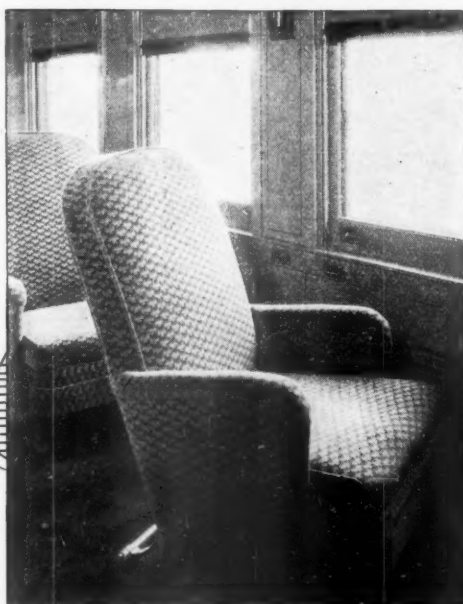
MODERN travel has been endowed with all the social charm and convenience associated with the home . . . And patrons of railroad travel react quickly to upholstery comfort and artistic beauty. This is why Chase VELMO . . . the highest development in Mohair upholstery is meeting every demand of the modern traveler.

"Riding on velvet" is more than a picturesque phrase typifying the acme of riding comfort; it is an actual experience enjoyed by passengers riding in modern day coaches and de luxe cars upholstered in Chase VELMO . . . the luxurious Mohair Velvet that provides permanent beauty and economy of upkeep. Samples on request.

CHESAPEAKE & OHIO — PERE MARQUETTE R. R.

CHASE
Velmo

Made by Sanford Mills
Sanford, Maine



CHASE
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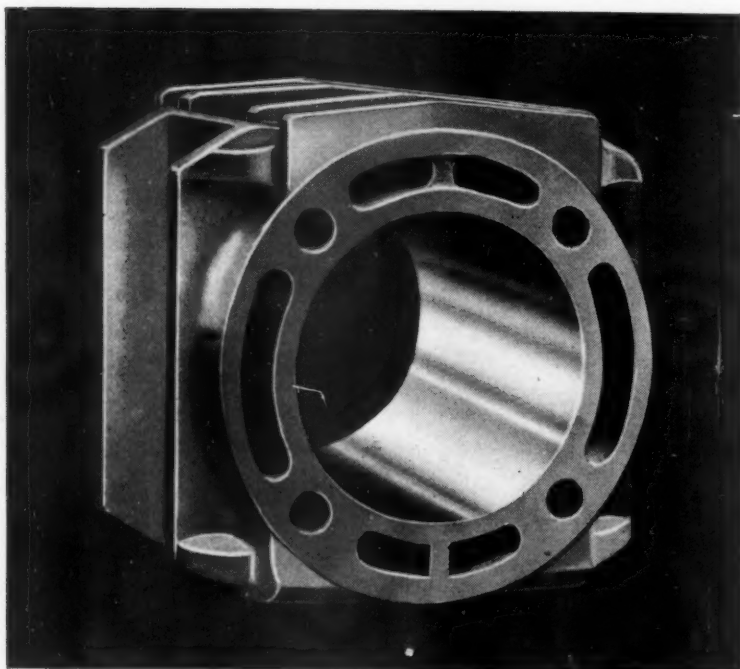
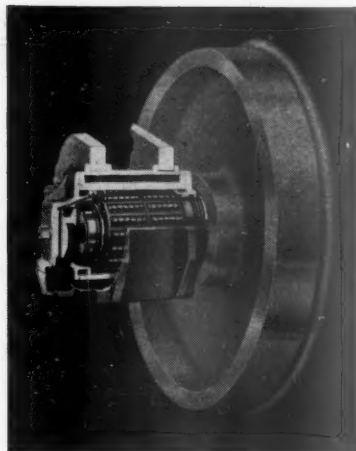
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Boston . New York . Detroit
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IMPERIAL SALON CARS . . . VELMO UPHOLSTERED



INTERIOR OF LADIES' SMOKING ROOM SHOWING UPHOLSTERY AND PILLOWS OF CHASE VELMO

THIS INTEGRAL OUTER RACE...



ADDS STRENGTH AND LONG LIFE

TRULY compact, is the Fafnir-Melcher Box. Roller path, equalizer seat, pedestal guides and oil reservoir are combined in a single unit. Distortion is impossible. Replacement costs are greatly reduced.

To provide an ideal, wear-resisting roller path, a special, tough alloy is used for the casting, giving long life also to pedestal guides and equalizer seats. The elimination of the conventional separable outer race permits a thicker, and hence stronger, wall section, which effectually precludes any deformation even under severe overload.

Smooth, power-saving operation is further aided by the patented and exclusive Fafnir-Melcher wick lubrication. This positive-circulating and filtering lubrication system keeps the bearing supplied with the right amount of clean oil at all temperatures . . . under all conditions of service.

Details of the Fafnir-Melcher design are discussed from every angle in the Railway Bulletin. Write for a copy.

Every requirement fulfilled!

1. Ample capacity to carry all loads without heating.
2. Positive lubrication at all speeds and temperatures.
3. Lateral adjustment possible when made necessary by truck wear or distortion
4. Insulation from shocks and deadening of noise.
5. Interchangeability with A.R.A. equipment.
6. Simplicity of installation and maintenance.

FAFNIR BEARINGS INCORPORATED

General Sales Office and Factory—New Britain, Conn.

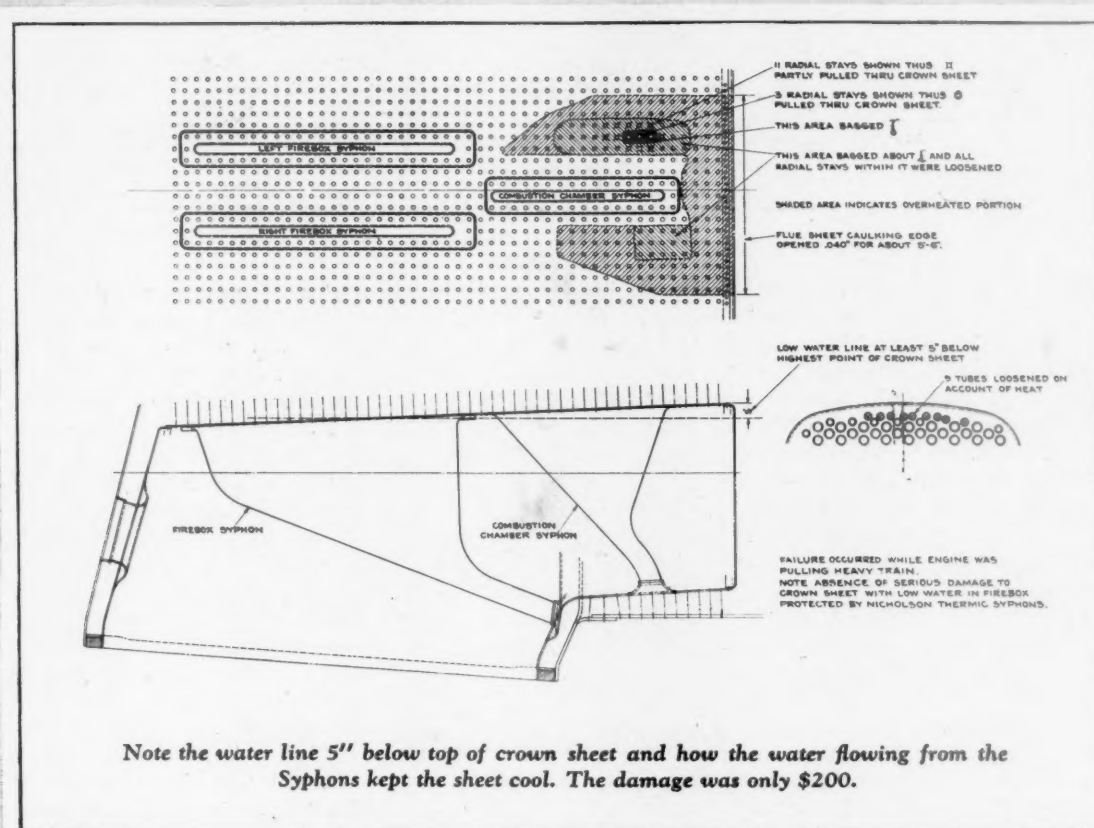
General Sales Office—Western Div. 806 W. Washington Blvd., Chicago, Ill.

FAFNIR-MELCHER Roller



Bearings for Car Journals

The Combustion Chamber **SYPHON** Has AGAIN Proved Its VALUE as a **SAFETY DEVICE**

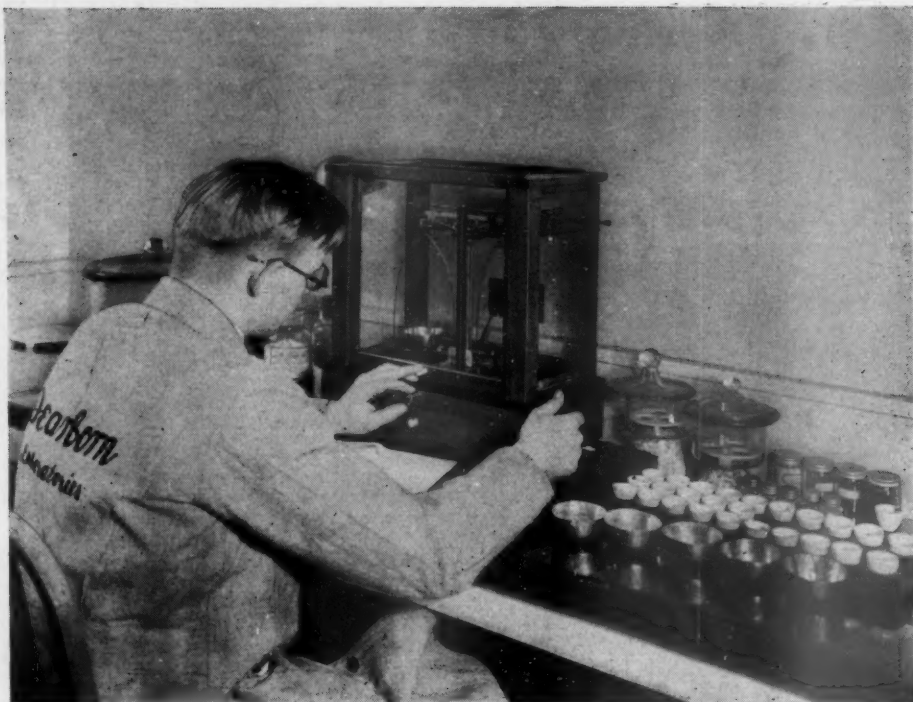


The crown sheet of a high pressure locomotive after recently passing a severe low water test.

Low water has occurred on 23 Syphon-equipped locomotives. Water levels dropped to points ranging from 2¼" to 16" below the tops of the crown sheets on the respective boilers. Without exception Syphons prevented serious damage.

LOCOMOTIVE FIREBOX COMPANY
NEW YORK CHICAGO MONTREAL

The Challenge of Increasing Pressures



The increasing steam pressures employed in locomotive operation demand exact scientific accuracy in correction of harmful water tendencies. Both high efficiency and safety are dependent upon complete correction of conditions that may cause scale formation, foaming, embrittlement, pitting and corrosion. The challenge of modern pressures is not as simple in regard to correction of water troubles as might appear. New considerations arise. Some corrective agents which produced desirable results under low pressures decompose chemically at higher pressures and produce the causticity which makes embrittlement possible. Increased circulation, and increased evaporation per unit of heating surface have required suitable types of treating materials.

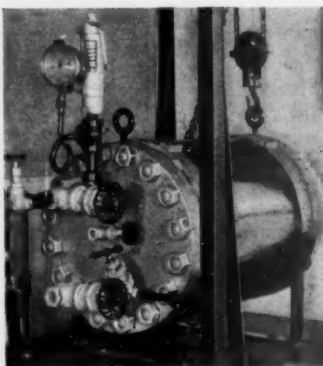
The Dearborn Chemical Company is working actively and successfully with the high pressures of today but the story of our accuracy and ability in water correction at modern pressures is the story of exacting research over nearly a half century. Ready ability to assume responsibilities and to overcome difficulties in their field of

work, has been this company's contribution to progress.

The Dearborn Chemical Company has met the challenge of modern service with the principle of research and scientific approach through our laboratories.

Our organization covers the six continents, embracing among our customers a large percentage of the world's railroads. To these customers our responsibility for results is constant and our service consistent with their requirements. It is obvious that for each of these railroads, association with the Dearborn Chemical Company is productive of desirable results in correction of water troubles. It is obvious that painstaking scientific approach to each railroad's water problems is productive of a degree of results not obtainable otherwise.

This service, this responsibility for results and this high effectiveness are available to you in equal degree, regardless of operating pressures and location. Write us, describing your conditions. Send gallon samples of your water supplies to our laboratories at 1035 W. 35th Street, Chicago.



An experimental high pressure boiler in the Dearborn Laboratories.

DEARBORN CHEMICAL COMPANY

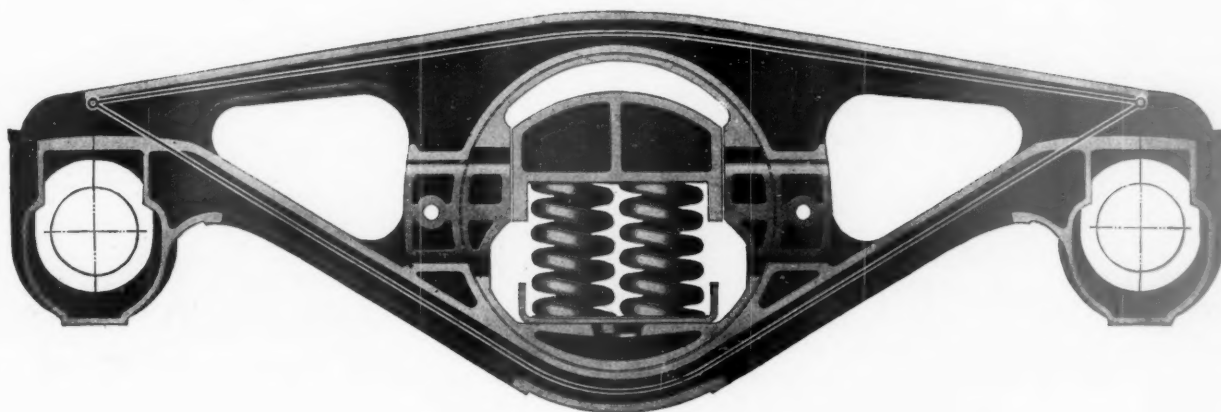
310 S. Michigan Avenue, CHICAGO

205 E. 42nd Street,
NEW YORK



Canadian Office and Factory:
TORONTO

TAYLOR FLEXIBLE TRUCK FOR FREIGHT CARS



THE illustration shows you in detail how the more efficient distribution of metal in a side frame is accomplished in the Taylor Flexible Truck.

The lines of force, both tension and compression—meet directly over the center line of journal boxes, and the tension member of the frame has a large radius curve at the bottom center with no abrupt change in section or shape. This produces a truss design of side frame with the members wholly in tension or compression, and eliminates the bending action that occurs in a side frame designed with a portion of the tension member flattened out at the center to support the springs.

This construction prevents the irregular stresses at various points in the frame so common in other trucks and for that reason is a more efficient and economical load carrying structure. It also eliminates the annoyance and expense of cracks in the small fillets at the junction of the bottom member with the bottom column.

The center ring in the circular hole of the side frame provides the flexibility features which result from the rotative motion of side frames about the springs, spring plank and bolster. Principal features of this truck are—greater safety—reduced vertical impact, easier riding, less flange wear and lower flange pressure—reduced train resistance—lower horizontal thrust due to ability of wheels to adjust themselves independently.

Thousands of these trucks have been in service for many years and afford every possible means to check the accuracy of these statements.

FLEXIBLE TRUCK CORPORATION

314 GANSTER BLDG.

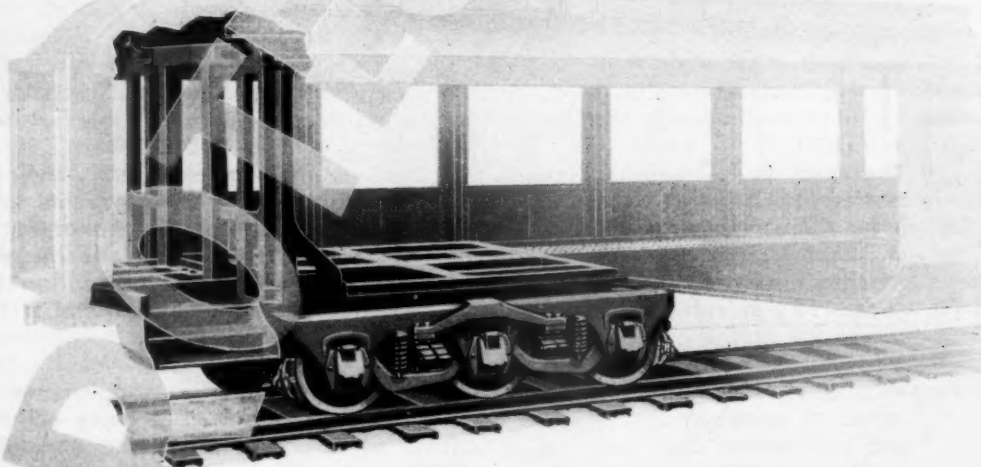
READING, PA.

CAST STEEL PLATFORM^{AND} ENDFRAME

PREVENTS
TELESCOPING

ASSURES
SAFETY

RUGGED TOP TIE
MEMBER REENFORCES
UPRIGHT END FRAME



PASSENGER CAR EQUIPPED
WITH PLATFORM, ENDFRAME
AND SIX WHEEL INTEGRAL
PEDESTAL TRUCK.

Commonwealth PRODUCTS

GENERAL STEEL CASTINGS CORP.
GRANITE CITY, ILL. EDDYSTONE, PENN.

ALL THAT'S LEFT



Is The *Squeal*

A great change has taken place in the stockyards since the time when an animal was killed only for its flesh. Today nothing is wasted. Everything, in some form or other, finds its way to the market . . . horns and hide, bristles and bones.

And when means were first invented for transforming heretofore waste material into commercially valuable products, General American built many of the railroad cars necessary to transport them.

Today the two industries are inseparably intertwined. The animals come to the yards in *stock cars*. The fresh meat is shipped

from the yards in *refrigerator cars*. Other products, including salted meat, canned meat and hides, are shipped in *box cars*. And many others, such as lard, gelatin, margarine, lubricants, and glue are transported in *tank cars*.

The construction of all kinds of railroad cars, however, is but one phase of General American's manifold operations. It also maintains a vast

fleet of 40,000 cars which it leases to shippers throughout the country . . . besides operating a large public export terminal for the storage and handling of bulk liquids, and an extensive European freight transportation system.



No matter what you are shipping, you will find it profitable to confer with our engineers. Railroad transportation is always dependable—a railroad car can be built to carry any commodity in bulk. Write or wire, Continental Illinois Bank Building, Chicago.

GENERAL AMERICAN TANK CAR CORP.
"a railroad freight car for every need"

THIS ADVERTISEMENT APPEARS IN APRIL ISSUES OF NATIONAL MAGAZINES TELLING EXECUTIVES SOMETHING ABOUT OURSELVES AND STRESSING THE FACT THAT "RAILROAD TRANSPORTATION IS ALWAYS DEPENDABLE."

CENTRAL CONTROL

GUIDES INTENSIVE DEVELOPMENT PROGRAM

The first Sperry Detector Cars placed in service owed their outstanding rail test efficiency to the research foundation laid, over a period of years, by an organization provided with every human and material resource needed for painstaking and far-sighted development work.

Since that time, the centralized research facilities of the Sperry Rail Service have continued a broad program of detailed improvement and standardization which give users the benefit of constant efforts exerted on behalf of increased efficiency and decreased cost of rail testing.

This research program can only be carried on by a central organization able to maintain the extensive staff and equipment necessary for large scale development work and able to benefit by the experience obtained from operating a large number of Detector Cars under a wide variety of conditions.



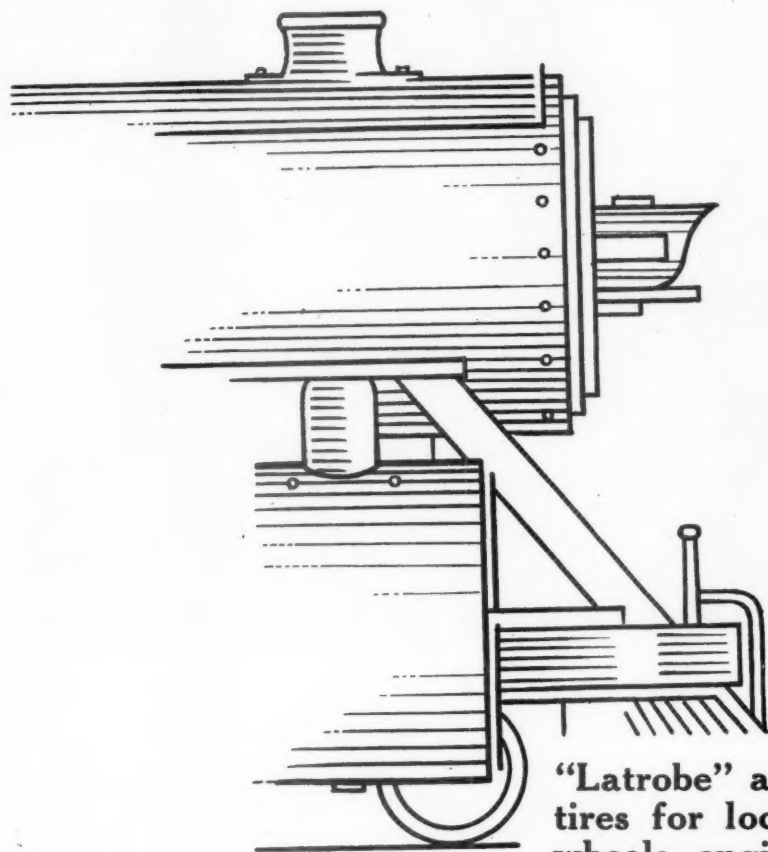
SPERRY RAIL SERVICE

SPERRY PRODUCTS, INC.

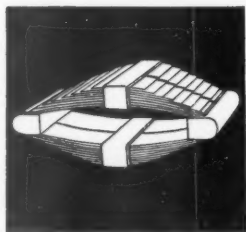
Sperry Building, Manhattan Bridge Plaza, Brooklyn, N. Y.

Chicago Office: 80 East Jackson Blvd.

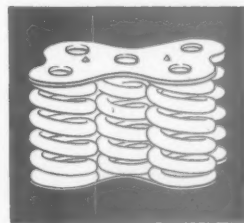
TIRES—For Locomotive and Car Wheels



“Latrobe” and “Interocean” tires for locomotive driving wheels, engine truck, tender truck and trailing wheels provide for long life, safety and economy under the high speed and great weight of modern equipment.



They are made by experts in tire construction. Long years of experience and a thorough knowledge of traffic conditions make it possible for them to produce tires that meet every requirement.



Railway Steel-Spring Company

30 CHURCH ST., NEW YORK

Branch Offices:

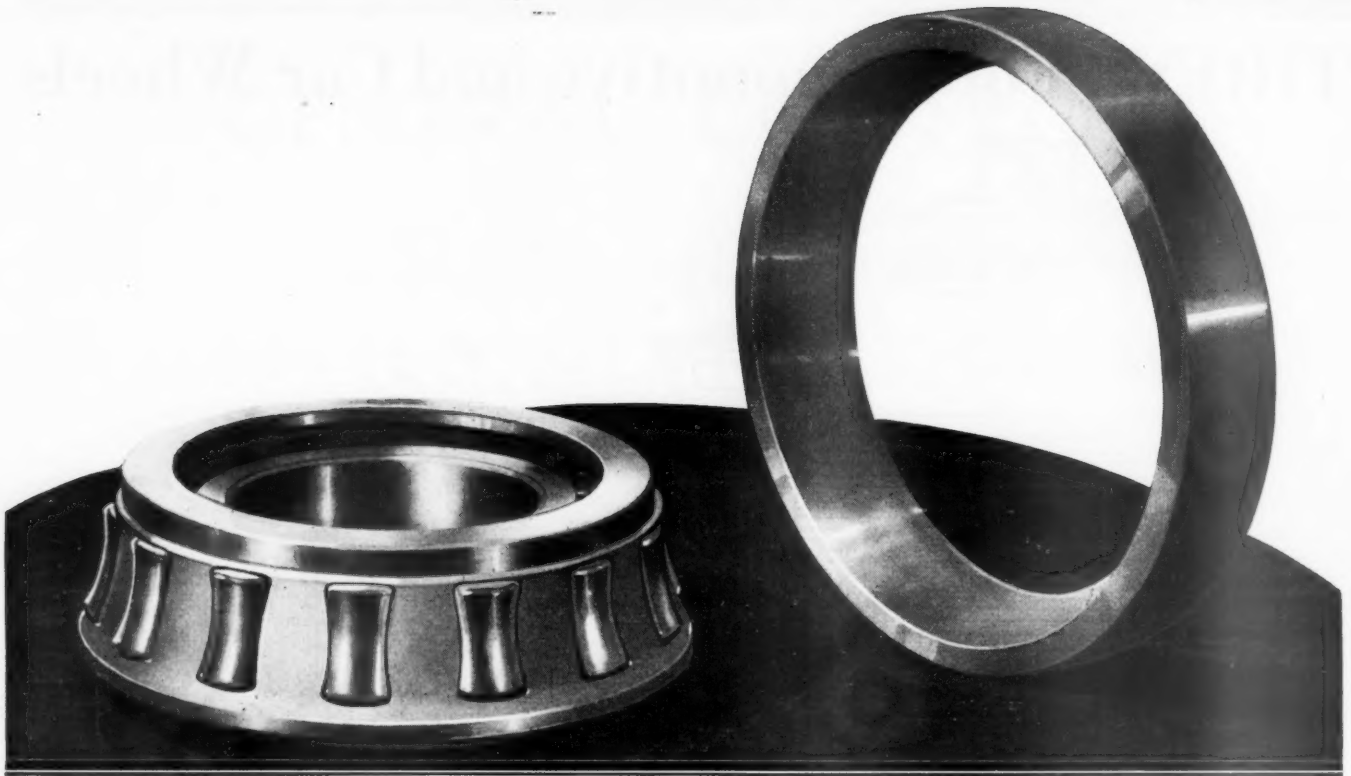
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THIS BEARING DESIGN » » » » IS FUNDAMENTALLY CORRECT FOR RAILROAD SERVICE » » » »

Railroad operating conditions are unlike those in other classes of service—different in load conditions, in the requirements for maximum security, in maintenance and inspection standards.

The compact self-aligning design of Shafer Roller Bearings incorporates all the mechanical features required in even the severest of railroad applications. Generous capacity for radial and thrust loads, and uniformly free rolling action are inherent features of the exclusive

Shafer design. The desirable operating characteristics of the concave roller—convex raceway assembly—full load bearing areas, natural alignment of rollers, proper contact, automatic and positive self-alignment—are retained undiminished under the severest of shock and thrust loads produced by fast runs under heavy equipment.

These are the reasons for the remarkable performance record being rolled up by Shafer bearings in the service of prominent roads all across the country.

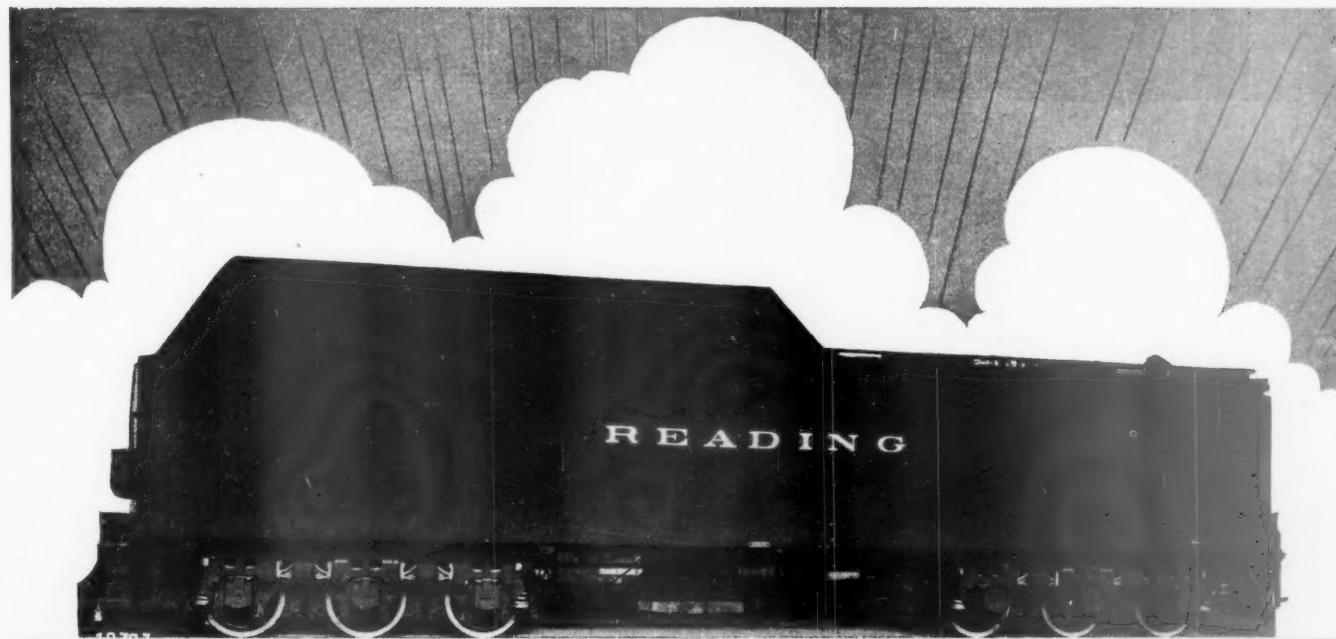
SHAFER

SELF-ALIGNING

ROLLER BEARINGS

SHAFER BEARING CORPORATION, 6501-99 West Grand Avenue, Chicago, Illinois

RA 3-28 Gray



Quenched and Tempered Tender Wheels

This twelve wheel tender weighs 132,000 pounds light weight and 378,300 pounds loaded weight. When the tender is fully loaded, these twelve wheels must bear a load of approximately 189 tons. For this service, a wheel must be used that will render the maximum service with the longest life possible. Extensive tests show that the quenched and tempered steel tender wheel is the best for this severe service. Ask our engineers to tell you about them.



STANDARD STEEL WORKS COMPANY

General Offices and Works: Burnham, Penna.

Chicago
New York

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Akron

Portland
San Francisco





Absorption

Crushed stone dropped by a steam shovel on the floor of a car delivers an enormous blow. One of the main reasons for using Ajax Corrugated Doors is their ability to absorb such blows without distortion.

AJAX
CORRUGATED
DROP DOORS

UNION METAL PRODUCTS COMPANY

NEW YORK • CHICAGO • ST. LOUIS • WASHINGTON • RICHMOND
HOUSTON • SAN FRANCISCO • KANSAS CITY • MONTREAL

Fairbanks-Morse "Sheffield" No. 46 section motor car has Timken Bearings in wheels and on engine crank shaft

Light weight is stressed as an important feature of this section motor car, which is said to weigh less than 400 pounds.

To secure this desirable lightness without sacrificing strength and ruggedness was the problem the designers had to face. Its solution included Timken Bearing protection at the vital points.

Ten Timkens are used—two in each of the four axle boxes and two on the engine crank shaft.

Wheel stability is thus assured under all track and speed conditions. Radial, thrust and combined loads are surely and safely carried. Lubrication is a negligible factor. Hot boxes are avoided.

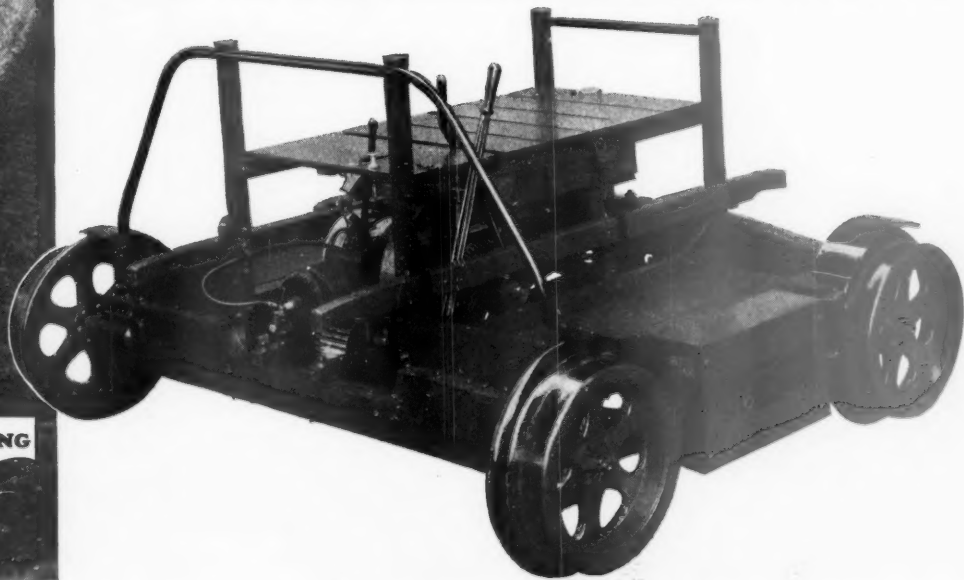
The mounting of the engine crank shaft on Timken Bearings is a modern practice followed by other leading gas engine builders. It protects the engine against vibration, holds the crankshaft in rigid alignment, protects it against uneven cylinder pressures and enables the engine to deliver maximum power.

Long life and low maintenance follow as a matter of course. The Timken Roller Bearing Co., Canton, Ohio.

TIMKEN Tapered Roller **BEARINGS**



Tapered Roller
TIMKEN BEARING
EQUIPPED



Universal

ONE-HAND BRAKE

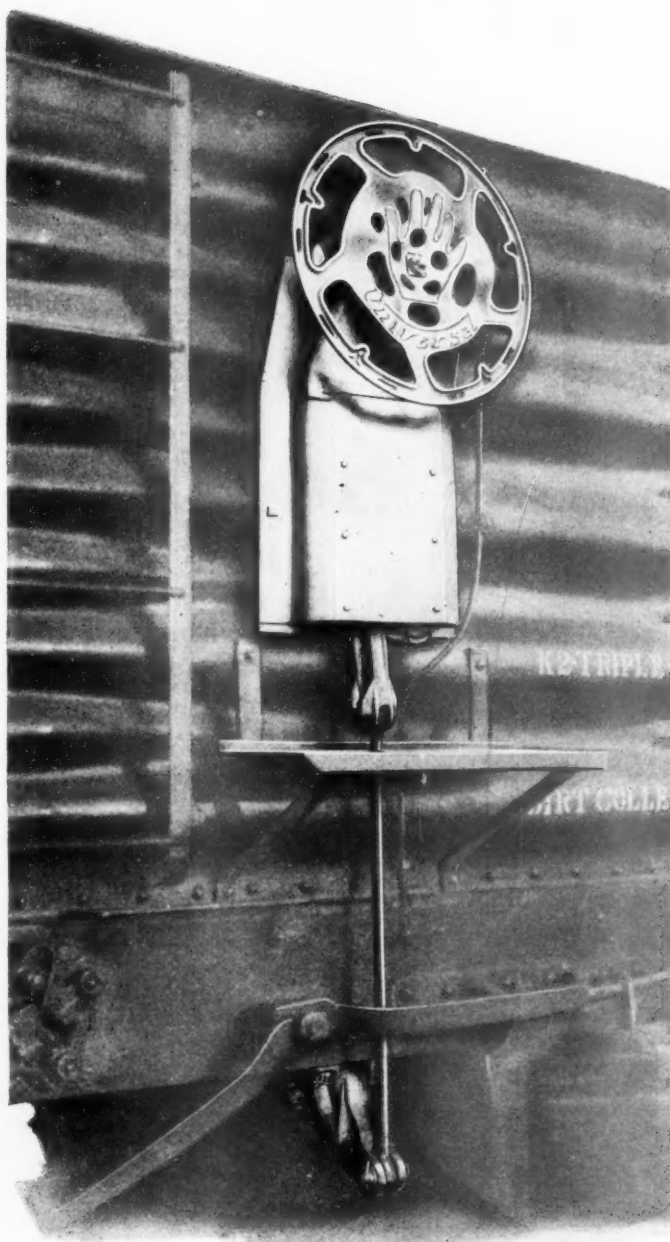
Perfect control of car with ONE HAND, leaving the other hand and both feet free to maintain a SAFE position.

AMPLE POWER without use of gears or other complicated mechanism.

UNIT construction. Easily and economically applied to car without change to Brake Rigging.

Principle Correct—Proven by years of satisfactory service on many thousands of cars.

Past performance shows maintenance cost to be practically negligible.



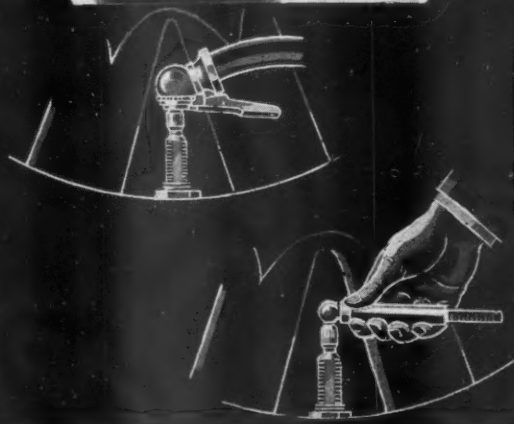
Universal Draft Gear Attachment Co.

332 South Michigan Ave., Chicago

Royal Bank Building, Montreal, Canada

**INFLATE.
TEST PRESSURE.**

THROUGH THE VALVE CAP!



The New
Schrader
REG. U.S. PAT. OFF.
DUBLCHEK
VALVE CAP
Saves Labor - Saves Time

THE new "Dublchek" Valve Cap has four outstanding features of interest to truck, bus and fleet owners:

1. Permits inflation and deflation of tires without removing the cap from the valve stem.
2. Permits gauging of air pressure while cap is still on the valve stem.
3. If affixed according to directions is guaranteed airtight up to 250 lbs. pressure.
4. Applied with pliers and remains permanent. It can't be lost.

Of particular importance are the savings in time which the "Dublchek" Cap makes possible.

It is no longer necessary to remove the dust cap and valve cap and replace them to inflate or gauge tires. Just screw on a "Dublchek" Valve Cap with pliers and inflate and gauge through the cap mechanism. Dust and grit are shut out from the valve mechanism just as effectively as before—and the new cap offers a double check against loss of air through the valve. Equip your tire valves at once with these new time-saving valve caps. Order from your regular supply house. . . . A. Schrader's Son, Inc., Brooklyn, Chicago, Toronto, London.

Be sure it's a Schrader—Look for the name

Schrader

Makers of Pneumatic Valves Since 1844

TIRE VALVES

TIRE GAUGES

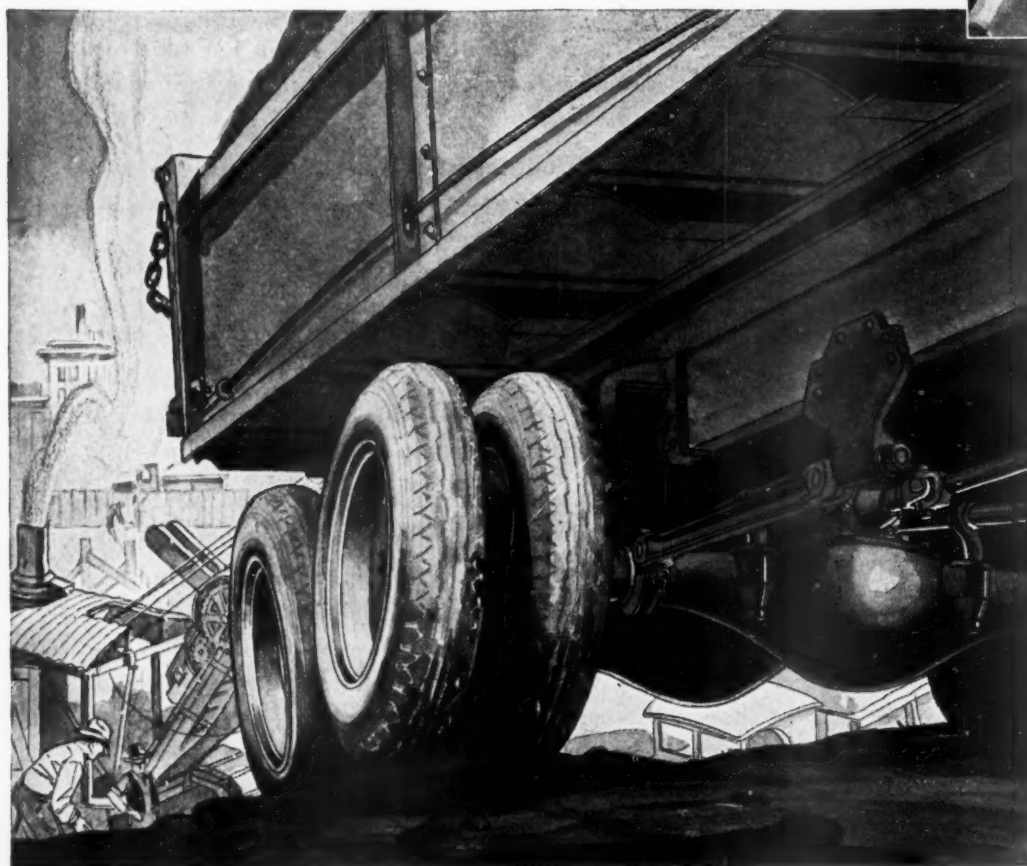
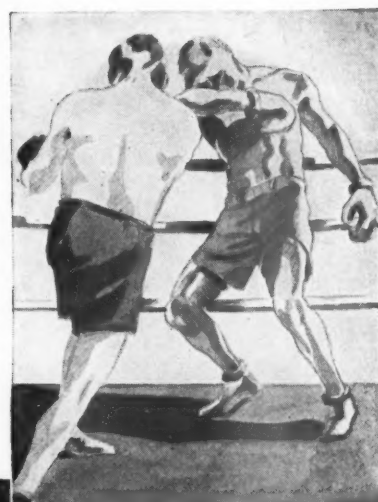
TOUGH *and* WILLING

Necessary to the good fighter—toughness to stand battering punishment; willingness to take on *anything* or anybody . . . these same staunch qualities help make the Timken Six-Wheel Unit a real heavy-weight champion.

Two live axles instead of one; four driving wheels; four-wheel or six-wheel brakes; weaving flexibility and uncanny traction that gives a toe-hold in the worst places; all built around the workmanlike efficiency and stamina of Timken Axles.

A step ahead—Timken Six-Wheel Units are now built with worm and double-reduction driving units interchangeable.

To do most heavy-duty jobs better, quicker, cheaper; to tackle and *lick* a lot of jobs that no two-wheel drive can even attempt—just part of the day's work for the Timken Six-Wheel Unit.



TIMKEN SIX WHEEL UNIT

THE TIMKEN-DETROIT AXLE CO., DETROIT, MICH.

\$50,000,000

Southern Pacific Company

Fifty-Year 4½% Gold Bonds

Due May 1, 1981

Coupon bonds in denomination of \$1,000 registerable as to principal and exchangeable for fully registered bonds. Registered and coupon bonds interchangeable under conditions provided in the Indenture. Interest payable May 1 and November 1.

GUARANTY TRUST COMPANY OF NEW YORK, Trustee.

Redeemable as a whole, but not in part, at the option of the Company, upon not less than sixty days' previous notice, on any interest date, up to and including May 1, 1951, at 110% and accrued interest, and thereafter on or before May 1, 1976 at 105% and accrued interest, and thereafter at their principal amount and accrued interest plus a premium equal to ½% for each six months between the redemption date and the date of maturity.

The issuance and sale of these Bonds are subject to the approval of the Interstate Commerce Commission.

In the opinion of counsel, these Bonds are a legal investment for savings banks in the States of New York, Ohio, California and other States.

For further information regarding the Company and this issue of Bonds, reference is made to a letter dated March 25, 1931, from Henry W. de Forest, Esq., Chairman of the Board of Directors of the Southern Pacific Company, copies of which may be obtained from the undersigned and from which the following is quoted:

"These bonds are to be the direct obligation of the Southern Pacific Company and will be issued under an indenture to Guaranty Trust Company of New York, Trustee, which will provide among other things that so long as any of the bonds of this issue shall be outstanding the Southern Pacific Company will not create any new mortgage or deed of trust (other than mortgages and deeds of trust to extend or refund existing liens, as set forth in the indenture) upon any of the lines of railroad or branches, leaseholds or trackage rights or other railroad property, now owned by it, or upon any similar property now owned by a subsidiary railroad company (as defined in the indenture) should such property hereafter be acquired by the Southern Pacific Company, unless effective provision be made in such new mortgage or deed of trust that the bonds of this issue shall be secured by such mortgage or deed of trust ratably with any other indebtedness secured thereby.

The proceeds of the sale of these bonds will be applied to provide for the maturities, on May 1, 1931, and July 1, 1931, respectively, of \$13,418,000 principal amount of Mexican & Pacific Extension First Mortgage Gold 5% Bonds and \$2,539,000 principal amount of Mexican & Pacific Extension Second Mortgage Currency 5% Bonds of Galveston,

Harrisburg & San Antonio Railway Company, a subsidiary of the Company, and for other corporate purposes.

The gross income of the Company and all its wholly controlled affiliated companies for the year ended December 31, 1930, before Federal Income Taxes, applicable to fixed charges amounted to \$64,486,297, while such charges amounted to \$33,164,747, leaving, after such charges and income taxes, \$29,842,181, which is equivalent to over eight percent on the capital stock of the Company outstanding during the year.

Earnings of the Southern Pacific Company (including earnings of leased lines and dividends from separately operated subsidiaries) available for fixed charges of the Company and lessor companies, all computed in accordance with the provisions of the Banking Law of New York covering investments by savings banks, have been more than twice fixed charges in each of the last five years.

The Southern Pacific Company has at present outstanding \$372,381,806 of Common Capital Stock. Dividends on this stock have been paid uninterruptedly since 1906, the present dividend rate being 6% per annum.

Application will be made in due course to list these bonds on the New York Stock Exchange."

THE UNDERSIGNED WILL RECEIVE SUBSCRIPTIONS FOR THE ABOVE BONDS, SUBJECT TO ALLOTMENT, AT 96¾% AND ACCRUED INTEREST TO DATE OF DELIVERY, TO YIELD ABOUT 4.67% TO MATURITY.

The undersigned reserve the right to close the subscription at any time without notice, to reject any application, to allot a smaller amount than applied for and to make allotments in their uncontrolled discretion.

The above bonds are offered if, when and as issued and received by the undersigned and subject to the approval by the Interstate Commerce Commission of the issuance of the bonds and their sale to the undersigned and to approval by their counsel of all legal proceedings in connection therewith. Temporary bonds or interim receipts will be delivered against payment in New York funds for bonds allotted, which temporary bonds or interim receipts will be exchangeable for definitive bonds when prepared.

Kuhn, Loeb & Co.

New York, March 26, 1931.



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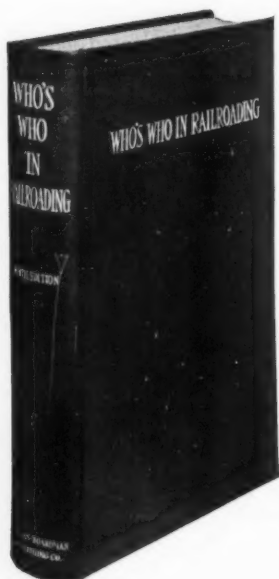


Just Off the Press

Now Ready

WHO'S WHO IN RAILROADING

United States-Canada-Mexico-Cuba



The new (Ninth) edition of the "Biographical Directory of Railway Officials of America" is based upon a complete recent survey of the field. Practically all the data presented was obtained directly from the persons concerned by means of questionnaires. Biographical sketches of some 4,000 railroad officials, equipment manufacturers, economists, members of regulatory commissions and others whose work is directly connected with the railroad industry of North America are included.

600 pages, 6 x 9 inches, cloth or buckram binding, \$8.50

Transportation Glossary

By H. G. BRADY

Technical and semi-technical terms, phrases and expressions in common use in railway, highway, air transportation and port traffic are concisely defined in this handy little glossary. The definitions are based upon highest authority. Cross references to pertinent classifications enable quick tracing of desired information.

5 x 7 inches, 114 pages, flexible cover, \$1.75

Regulation of Railroad Finance

By JOHN H. FREDERICK, Ph. D.

Assistant Professor of Commerce and Transportation

FRANK T. HYPPS, Ph. D.

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Assistant Professor of Geography and Industry in the Wharton School of Finance and Commerce University of Pennsylvania

The regulation of the financial affairs of railroads by the Federal government through the Interstate Commerce Commission, under the Transportation Act of 1920, is clearly explained in this new book—the only one on the subject. The various tests applied by the Commission in determining the elements of public interest to which the statute usually refers are traced together with the nature and reasons for the Commission's action in regulating the financial affairs of the railroads.

The granting of certificates of public convenience and necessity for the construction and abandonment of railroads, the regulation of unification through acquisition of control of one carrier by another, the regulation of interlocking directorates and the issuance of the various types of railroad securities are expertly examined.

CONTENTS

Introduction—Certificates of Public Convenience and Necessity for Construction and Abandonment of Railroads—The Acquisition of Control of Carriers—The Recapture of Excess Earnings—The Issuance of Securities and Assumption of Obligations—Interlocking Directorates—Appendices: Provisions of the Interstate Commerce Act Administered by the Finance Bureau of the Interstate Commerce Commission—New Railroad Construction—Abandonments—Bibliography—Index.

225 Pages, tables, 6 x 9 inches, cloth, \$3.50

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By J. L. White

Formerly Assistant Comptroller, United States Railroad Administration; now Vice-President, Irving Investors Management Company, Inc.

Explains accepted methods of analyzing railroad accounts and statistical data to determine whether a department or an entire railroad is being operated efficiently.

393 pages, forms, cloth, 6 x 9, \$4.00

Railroad Electrification and the Electric Locomotive

By Arthur J. Manson

Manager, Heavy Traction Division Westinghouse Electric & Manufacturing Company

General and specific problems, and solutions connected with electrification of steam railroads written in non-technical language.

2nd Edition, 332 pages, 118 illustrations, cloth, 6 x 9, \$3.50



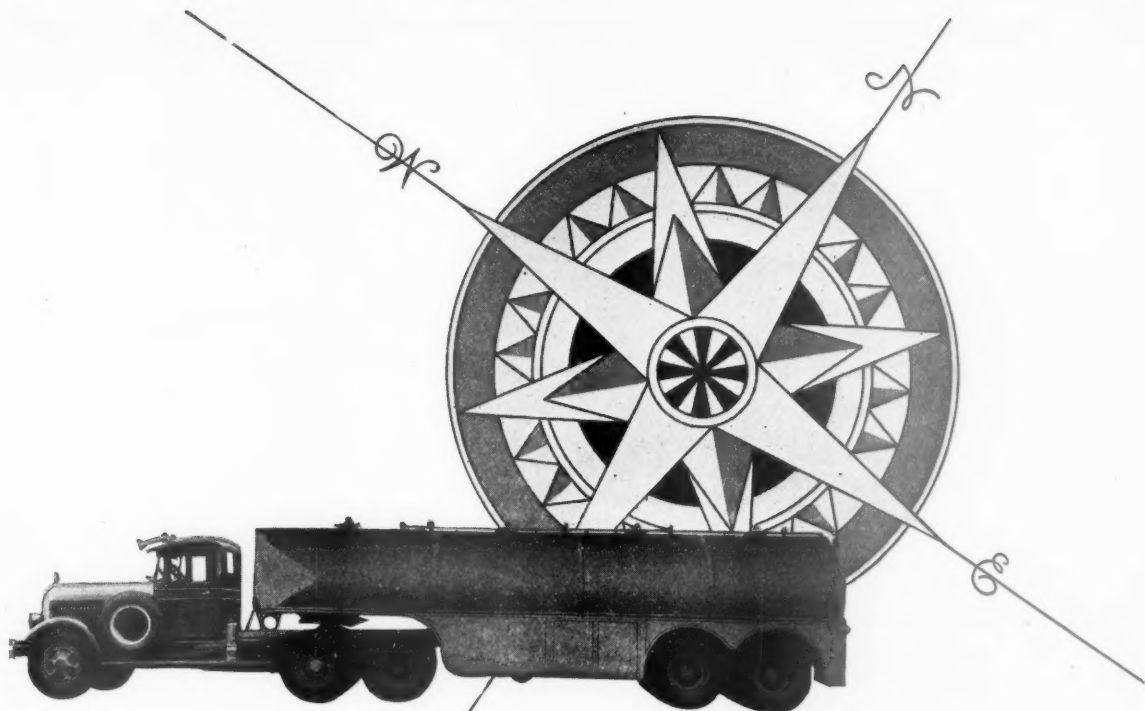
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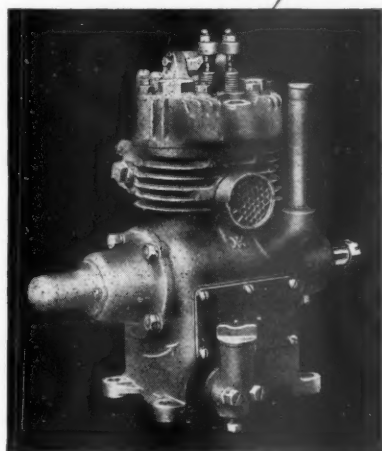
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TRAILER SYSTEMS
ARE *growing***

With the decided trend toward trailer operation comes a rapidly increasing demand for Bendix-Westinghouse Automotive Air Brakes. Manufacturers and operators alike have recognized the importance of perfect control for these colossal units and have eliminated, what might have become, a serious problem by the timely adoption of Bendix-Westinghouse equipment. The simplicity of modern Bendix-Westinghouse Brakes, coupled with their sure, quick, remarkably powerful action and smooth flexibility, has stamped them as the logical control for practically all of the world's ranking heavy duty motor transport vehicles. Inquiries from those not thoroughly acquainted with modern Air Brake Control will be appreciated. For the user of Air Brakes, a booklet outlining fully our modern Factory Reconditioning plan will be mailed upon request. Address the BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE CO., at Pittsburgh, Pennsylvania.



6287

BENDIX
WESTINGHOUSE
AUTOMOTIVE AIR BRAKES



The Packers Know a Good Investment

Wilson & Co., famous packers, use International Trucks. They bought their first Internationals five years ago. Since that time they have repeated to the extent of 140 trucks ... and 138 of these are still in active service today.

Wilson & Co. send these trucks to their many branches throughout the country. "Once an International has been put in service by a branch," the home office tells us, "that's the last we seem to hear of it, and no news in this case is the best kind of news." A detailed daily cost-and-upkeep record on every truck testifies to the soundness of the International investment ... and to remarkably low operating costs and upkeep. Some of these trucks run 200 miles or more per

day ... well over 60,000 miles a year.

International Trucks are highly favored in the packing industry. Swift, Armour and Cudahy use them and so do other packers the country over. There is only one answer ... Internationals give, unfailingly, the fast, reliable transportation upon which the success of the packing industry largely depends ... and give it economically!

That is one industry. International Trucks meet the transportation needs of every industry. Your trucking needs may be different ... but they are no exception to this rule! Every International meets the constant common demand for sound economy and solid dependability ... by the mile and by the ton.

**182
International
Company-Owned
Branches
in the United States
and Canada**

render exceptional service for widespread organizations or for single unit users.

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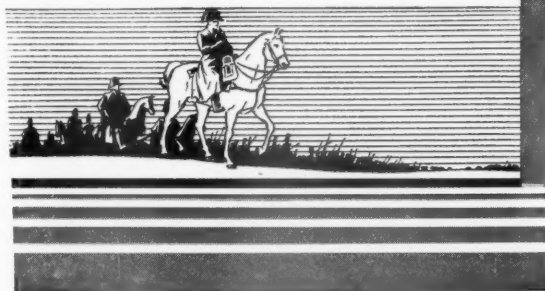
There is a full line of International Trucks, from 3/4-ton to 5-ton. Request a demonstration and one will be arranged immediately—a convincing demonstration, on your own job.

INTERNATIONAL HARVESTER COMPANY
606 So. Michigan Ave. OF AMERICA Chicago, Illinois
(INCORPORATED)

INTERNATIONAL TRUCKS

CANNED FOOD

answered
Napoleon's
problem



Ethyl answers the
problem of greater bus power

THE fast moving, hard fighting army of France had a food problem. "Find a way to keep food fresh," commanded the Emperor Napoleon; and Nicholas Appert discovered the canning process.

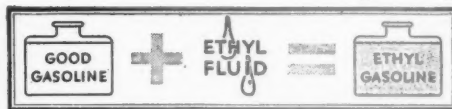
A few years ago automotive progress was checked because higher compression engines that gave the desired greater efficiency could not operate satisfactorily on ordinary gasoline. "We are stopped," said many engineers.

But one engineer thought otherwise. "Find a fuel that will stand high pressures," he said. And Ethyl fluid was developed. Added to good gasoline, Ethyl fluid produced a motor fuel that would not detonate under the higher pressures needed for efficiency.

High compression made possible by Ethyl Gaso-

line, offered increased power without increased weight. It made possible the new and better engines of today and the greater improvements that will come tomorrow.

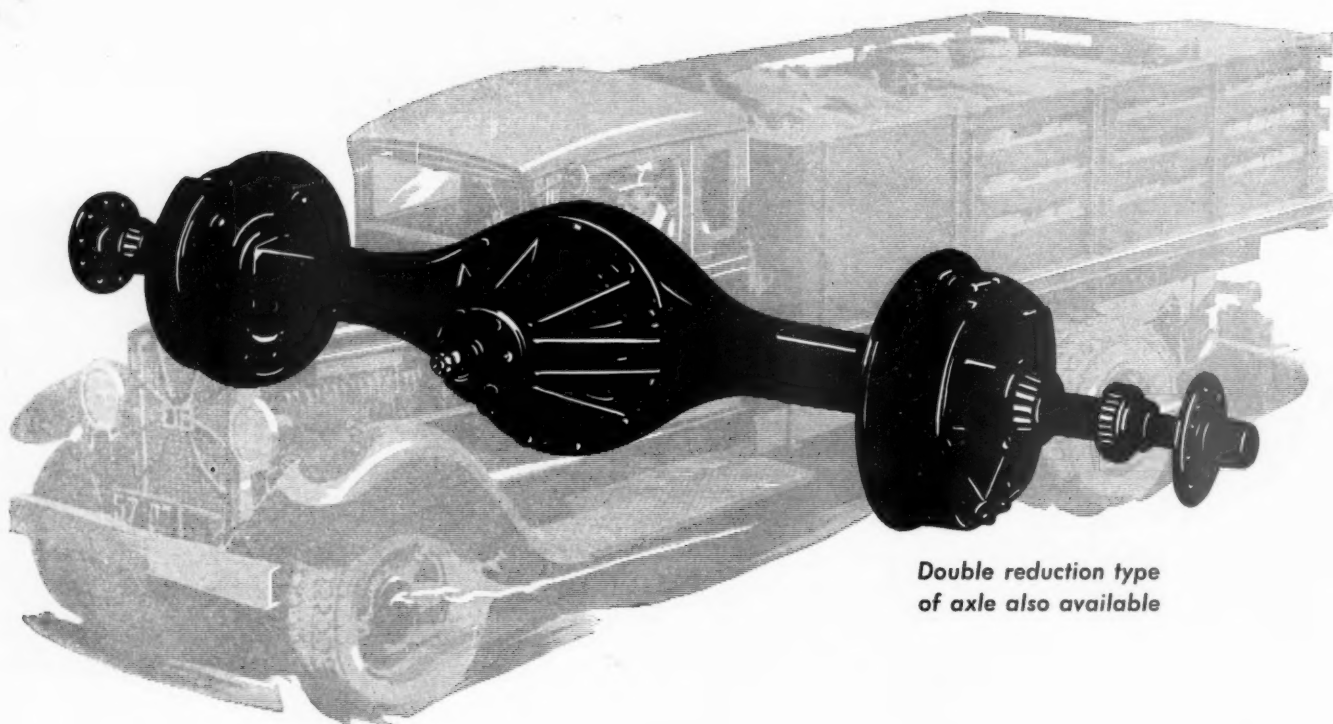
Ethyl Gasoline answered a problem of bus transportation by supplying fuel for engines that could deliver the high horsepower-per-unit-weight that is necessary to faster and more economical bus operation. The day of better bus performance is here. Take advantage of it. Ethyl Gasoline Corporation, Chrysler Building, New York.



The active ingredient used in Ethyl fluid is lead.

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ETHYL GASOLINE



Double reduction type
of axle also available

AXLES FOR HEAVY-DUTY WORK

From front bumper to rear frame cross-member, Dodge Heavy-Duty Trucks are "all-truck"—expertly-designed and precision-built for gruelling work.

The rear axle, for instance, is the full-floating type. Weight of truck and load is carried by the housing—shafts are free to transmit power solely. Drive is through spiral bevel gear. Pinion gear is straddle-mounted

for greater strength and permanent alignment. All gears are of finest nickel alloy steel. There are nine large adjustable roller bearings in all—two at outer end of each shaft. Housing of the banjo type is of electric furnace steel.

See your Dodge Brothers dealer. See Dodge Heavy-Duty Trucks. Inspect them and compare them. You

can buy the type for your needs complete with standard or special body to fit.

THE COMPLETE LINE OF DODGE TRUCKS RANGES IN
PAYLOAD CAPACITIES FROM 1,200 TO 11,175 POUNDS—
PRICED, CHASSIS F. O. B.
DETROIT, FROM \$435
TO \$2695, INCLUDING
1½-TON CHASSIS AT

\$595

DEPENDABLE
DODGE HEAVY DUTY **TRUCKS**

ROAD DELAYS NOW AN *EVENT*

because of Firestone's Exclusive Features

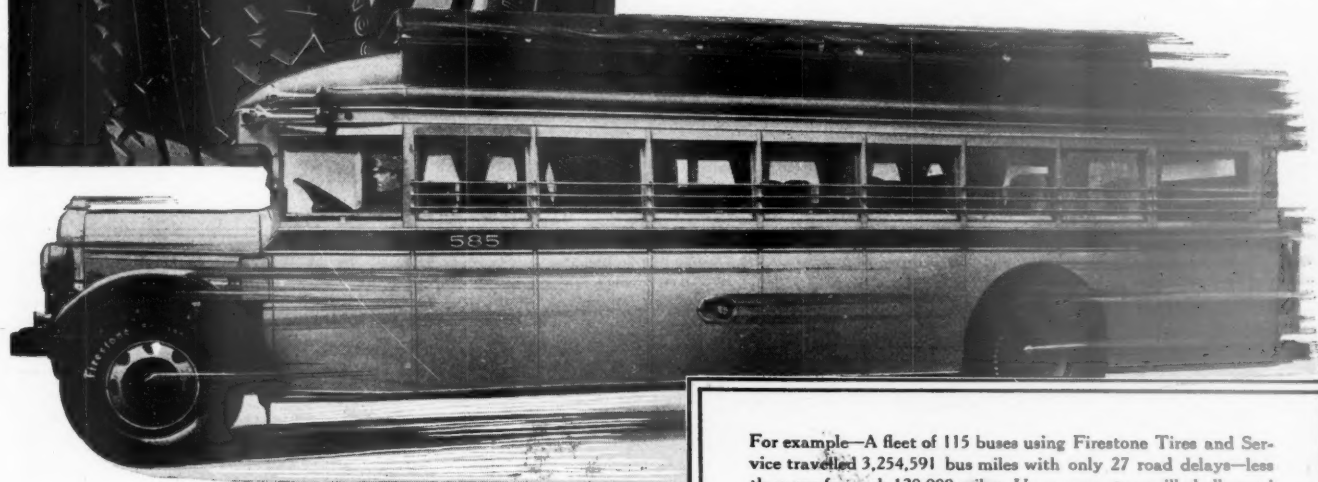


There was a time when passengers and operators alike thought there simply *had* to be road delays.

But no more! Not since fleets discovered how Firestone Bus Balloons and Firestone Service make "road failures" pretty much a thing of the past.

Operators have found that Firestone Gum-Dipped Balloons give *greater mileage* with less upkeep cost. Gum-Dipped Cords (exclusive Firestone feature), and the Patented Double Cord Breaker, which provides two extra plies under the tread, make them *tougher* for longer wear.

Your own fleet can profit by Firestone Service. Specify Firestone Tires, Puncture-Proof Tubes and Rims for complete equipment—and watch delays and expenses drop.



For example—A fleet of 115 buses using Firestone Tires and Service travelled 3,254,591 bus miles with only 27 road delays—less than one for each 120,000 miles. Upon request we will gladly send name of operator and full data.

Firestone

BUS BALLOONS

BATTERIES ■ BRAKE LINING ■ RIMS ■ ACCESSORIES

No FISH STORY ~ ~ ~ but STRAIGHT FACTS

RAILROAD men—the Universal Dry Lading Roof is the biggest catch of the season for saving money in building new cars, repairing old cars, and reducing the number of bad order cars.

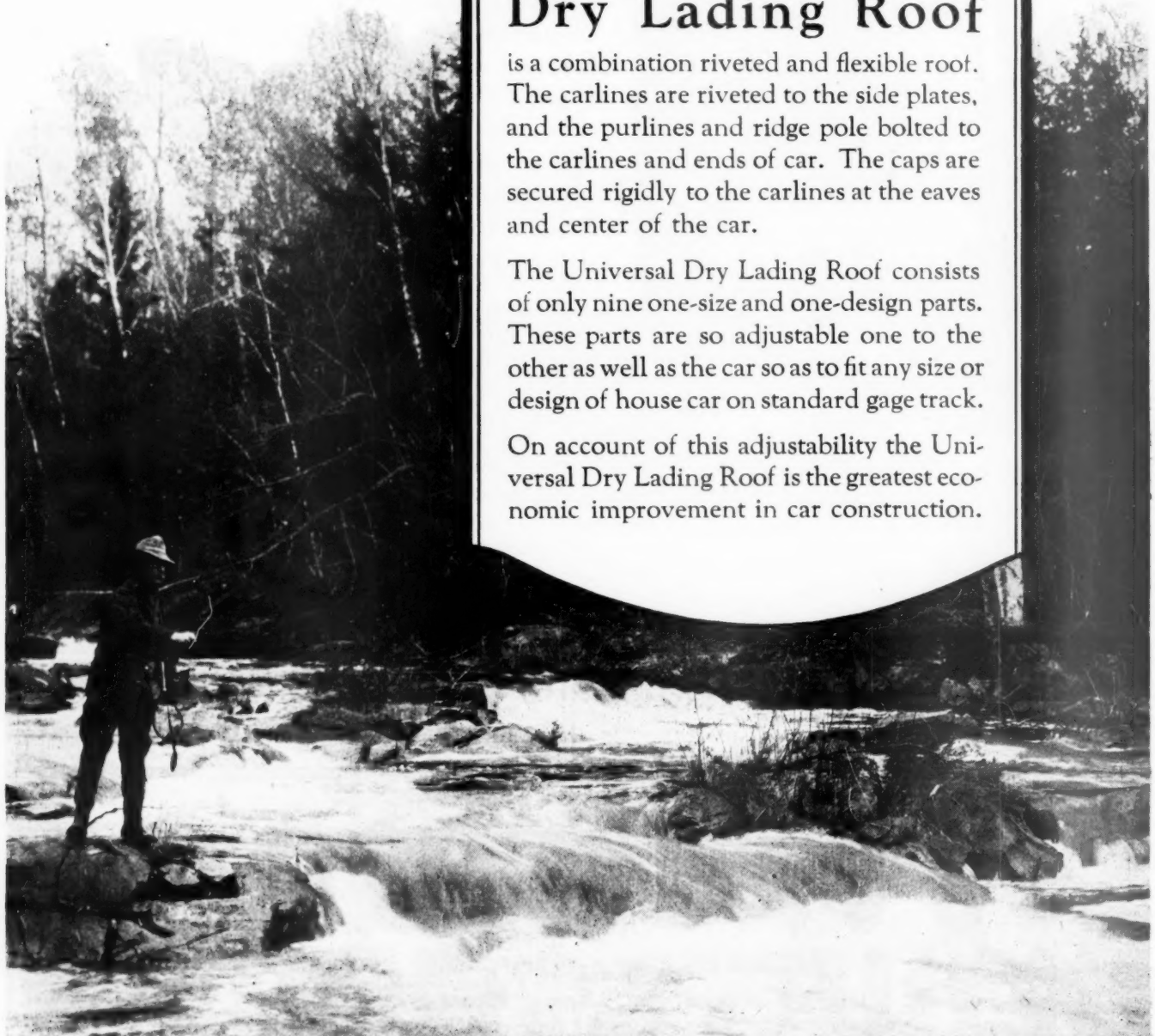
The

UNIVERSAL Dry Lading Roof

is a combination riveted and flexible roof. The carlines are riveted to the side plates, and the purlines and ridge pole bolted to the carlines and ends of car. The caps are secured rigidly to the carlines at the eaves and center of the car.

The Universal Dry Lading Roof consists of only nine one-size and one-design parts. These parts are so adjustable one to the other as well as the car so as to fit any size or design of house car on standard gage track.

On account of this adjustability the Universal Dry Lading Roof is the greatest economic improvement in car construction.



Hutchins Car Roofing Company



Missouri Pacific Bus Operations Extend Over 4,000 Mile System

THE Missouri Pacific is one of the railroads that early recognized the wisdom of protecting revenue by owning and operating the highway transportation service along its rail lines.

Its subsidiary, the Missouri Pacific Transportation Co., operates 38 motor coach routes over 4,116 route miles, carrying passengers and express in co-ordination with rail service.

In supplementing rail-passenger service a convenient method of transportation is provided those communities where neither rail nor highway service was available, as well as providing a means of transportation for those who prefer to travel on the highway.

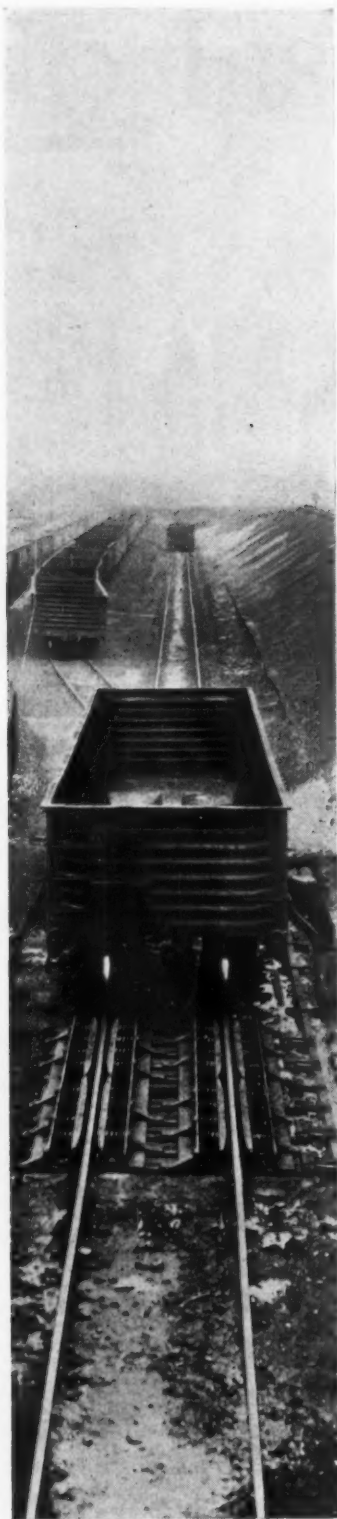
The Missouri Pacific Transportation Co., has been successful. Its expansion has been rapid. Co-ordination of service has resulted in the elimination of considerable rail-passenger mileage, and the consequent speeding up of both freight and passenger service. Bus operation also has effected closer connections with the more important trains.

The Missouri Pacific Transportation Co., operates 45 Whites. Their dependability and economy have contributed materially to the company's success.

THE WHITE COMPANY, *Cleveland*

WHITE BUSES

AND WHITE TRUCKS

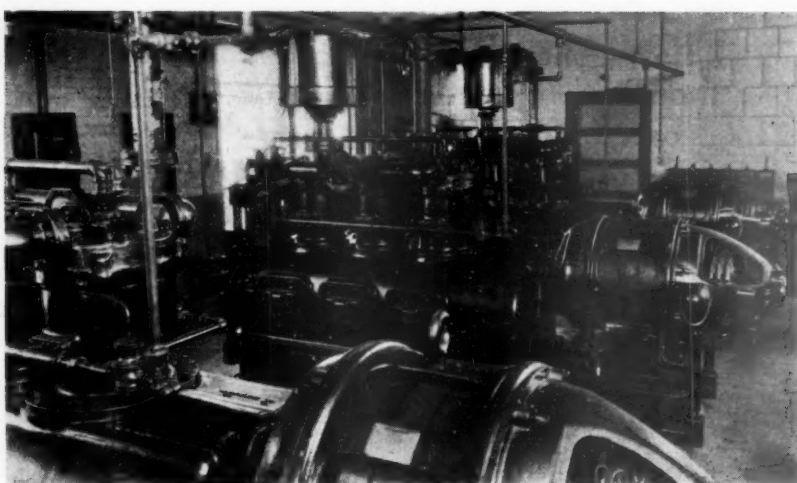


REMOTE-CONTROLLED AIR BRAKES — alias electro-pneumatic car retarders—have proved to be of outstanding value in expediting and safeguarding the movement of cars through classification yards, just as standard air brakes have permitted increased speeds with adequate safety in the movement of cars over the road . . . An adequate and reliable supply of compressed air is furnished by Westinghouse-National compressors for many of the prominent installations. The illustration shows a battery of three compressors used by an eastern railroad—the 3VS-32 machine, 382 cu. ft. displacement . . . This type of compressor is also used extensively by railroads to supply air for yard charging, signal operation, and a multitude of shop operations. It is noted for dependable service, economical operation, and long life.

WESTINGHOUSE AIR BRAKE COMPANY

General Office and Works:

Wilmerding, Pa.



WESTINGHOUSE—NATIONAL



Air Compressors



“Quality Machines for Quality Service”

..... and they have

Capacity-PLUS

The starting power of a locomotive is measured by tractive effort. But its effectiveness—its ability to produce the maximum of power under maximum conditions of load and speed—do not depend on starting power . . . but on boiler capacity.

Super-locomotives such as the 20 Hudson (4-6-4) type in use by the Canadian Pacific never lack that sustained steaming capacity so necessary to use effectively the starting power.

On these locomotives Elesco type "E" superheaters, which increase the quality and the volume of steam per pound weight, are factors in providing this sustained boiler capacity. Elesco feed water heaters, which preheat the boiler feed water with waste heat, add still more capacity with no additional fuel.

Elesco superheaters and Elesco feed water heaters are giving thousands of such super-locomotives the essential characteristics that enable them to move super trains at greater sustained speeds.

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60 East 42nd Street
NEW YORK



Peoples Gas Building
CHICAGO

Canada: The Superheater Company, Limited, Montreal

Superheaters

Feed Water Heaters

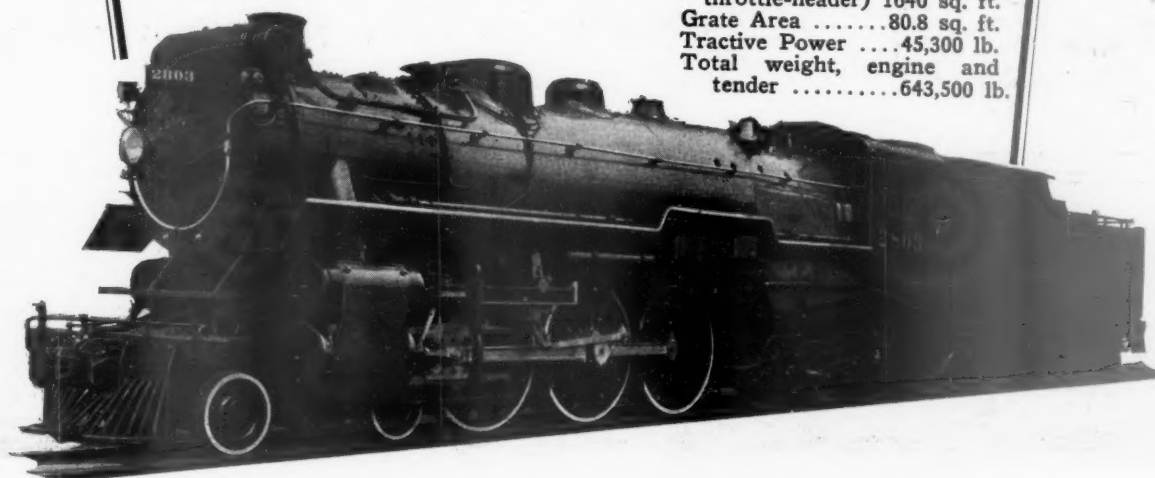
Superheated Steam Pyrometers

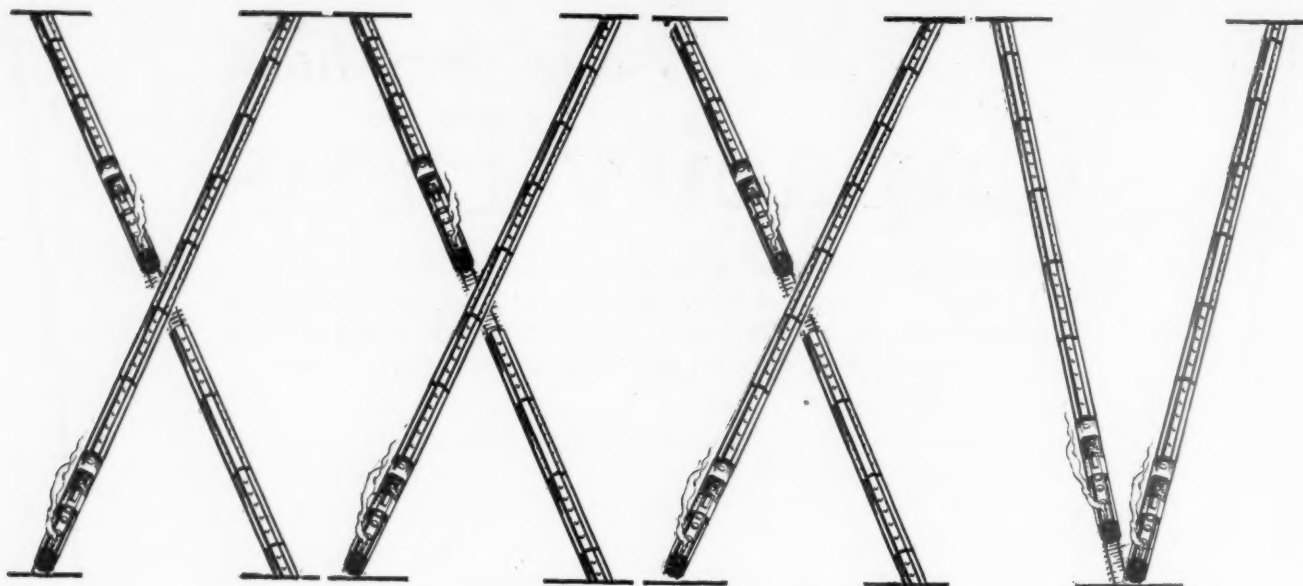
A-594

Exhaust Steam Injectors

Hudson (4-6-4) type Locomotive, Canadian Pacific Railway Company.

Cylinders 22" x 30"
Boiler pressure 275 lb.
Superheating surface (type "E" with multiple-valve throttle-header) 1640 sq. ft.
Grate Area 80.8 sq. ft.
Tractive Power 45,300 lb.
Total weight, engine and tender 643,500 lb.





Railroads

Now Using BARCO Passenger Car Steam Heat Connections

BARCO Steam Heat Connections *save steam* because they have full capacity in all positions with all 90° bends eliminated and are completely insulated.

They *save trouble* because they carry full steam pressure without leaking—the gaskets cannot blow out.

They *save maintenance costs* because their all steel construction permits repairs in case of accident and the gaskets last at least a year between renewals.

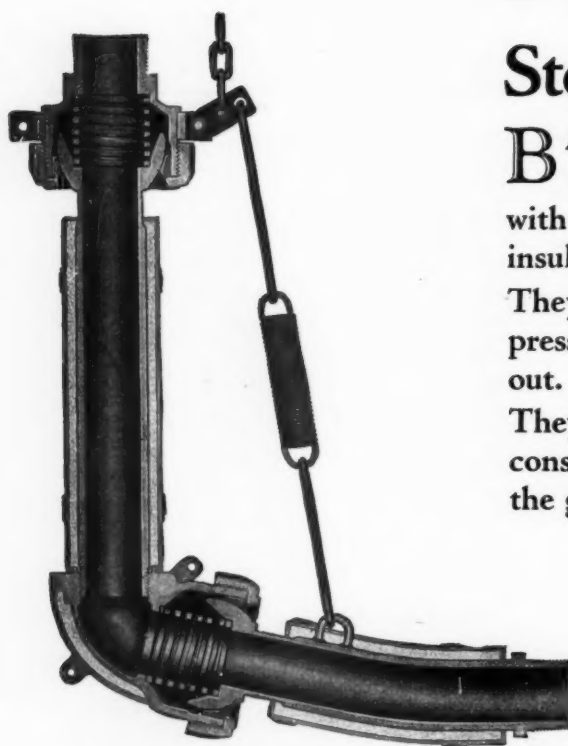
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Barco Manufacturing Co.

1801 Winnemac Avenue, Chicago, Illinois
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Cross-section showing improved design and construction, also method of insulating Barco Steam-Heat Connections

BARCO

**Making
the high-wheel
engine**

as effective on the H-E-A-V-Y P-U-L-L

The Bethlehem Auxiliary Locomotive brings to railroads the opportunity to make high-wheel engines as effective where high tractive effort at low speed is required as under the conditions for which they are primarily designed—to develop great sustained power at high speeds. The reserve drawbar pull which the Bethlehem Auxiliary Locomotive provides makes this one class of engine available for a wide range of service, and makes the locomotive more efficient under any conditions.

When used for fast-freight service the Auxiliary Locomotive enables the engine to start a train of such weight that it works at full capacity at road speed. The characteristics of the high-wheel engine are such that when it is loaded to its tonnage rating at road speed it either cannot start the train at all, or can do so only with excessive wear and tear on equipment. When used for heavy, slow-freight service

as on the *FAST RUN!*

the added tractive force of the Auxiliary places the high-wheel engine on a par with the heavy low-wheel locomotive.

This combining of the desirable characteristics of both classes of motive power greatly simplifies railway operation and results in very substantial economies.

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BETHLEHEM
AUXILIARY LOCOMOTIVE

Pyle-National Turbo Generators

meet the demands of modern railroading



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On the great majority of all roads Pyle-National turbo-generators have proved capable of meeting these rigid service requirements, and cutting operating and maintenance costs as well. Written in the day-by-day service records are the facts on performance proving Pyle-National leadership in design and operat-

ing efficiency. There are more Pyle-National turbo-generators in train control service than all other types combined—nothing but actual performance could bring about such universal acceptance of Pyle-National equipment.

There is a Pyle-National turbo-generator especially designed for each particular type of service. Send for descriptive bulletins, or consult the Pyle-National engineering staff on any matter of train control, locomotive lighting, train lighting, car and shop wiring, or yard floodlighting. Their broad experience is at your service.

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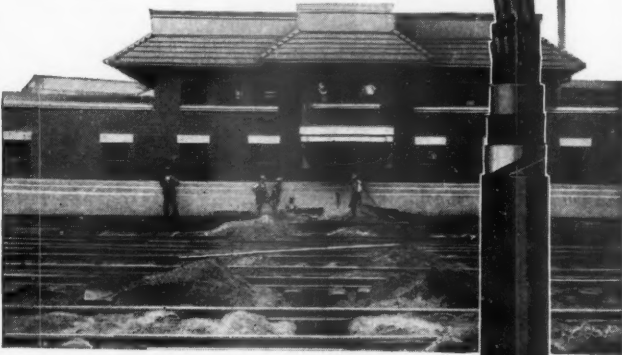
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RA 3-23 Gray

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Founded 1878

THE OKONITE-CALLENDER CABLE COMPANY, INC.
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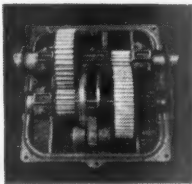
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General Electric Supply Corp. Boston, Mass.



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CRANES. WRITE FOR BULLETINS
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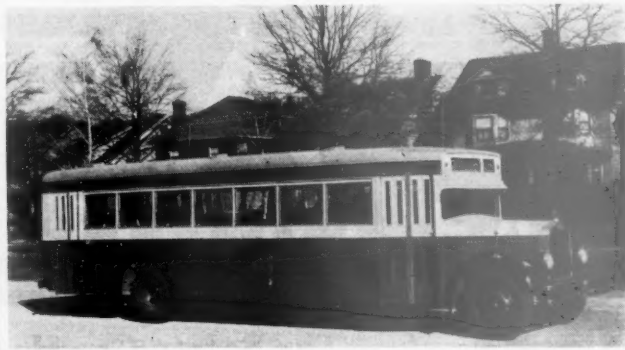


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Let our nearest Service Man show how to keep your fleet clean at low cost the Oakite way. Write and ask to have him call. No obligation.

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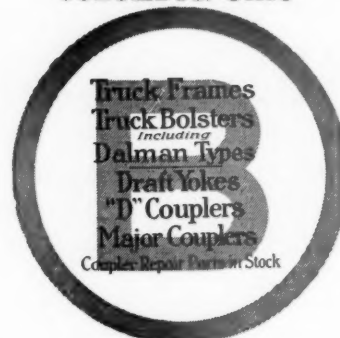
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LOW 56490	37210	22.6
AVERAGE 58344	38494	25.9

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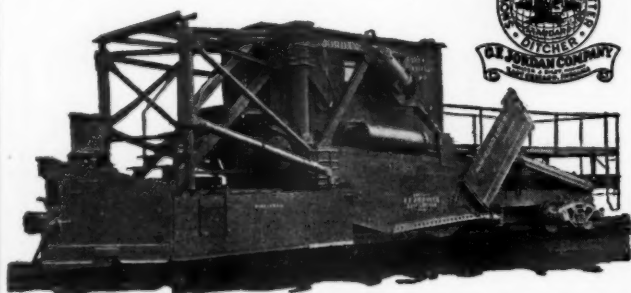
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Are Quick
Operating

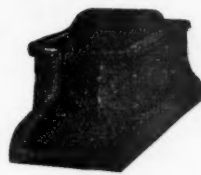
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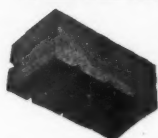
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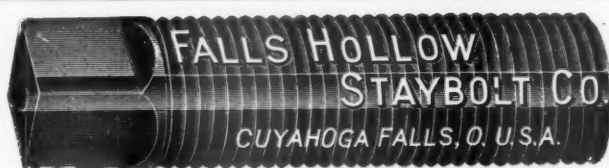
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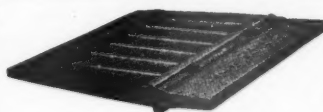
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International Harvester Co. White Co., The.</p>	<p>Coaches, Second-Hand. Hyman-Michaels Co.</p> <p>Coal, Ore & Ash Handling Machinery. Industrial Brownhoist Corp.</p> <p>Milwaukee Electric Crane & Hoist Corp. Roberts & Schaefer Co.</p> <p>Coal Pushers. Standard Stoker Co.</p> <p>Coaling Stations. American Bridge Co. Fairbanks-Morse & Co. Roberts & Schaefer Co.</p> <p>Cocks, Angle. Westinghouse Air Brake Co.</p> <p>Cocks, Blow-Off. Bird-Archer Co., The.</p> <p>Cocks, Cylinder. Prime Manufacturing Co., The.</p> <p>Columns, Water. Prime Manufacturing Co., The.</p> <p>Combination Crane Pile Drivers. Industrial Brownhoist Corp.</p> <p>Compounds, Boiler. Dearborn Chemical Co. Bird-Archer Co., The. General Electric Co.</p> <p>Compounds, Cleaning. Oakite Products, Inc.</p> <p>Compounds, Cutting. Oakite Products, Inc.</p> <p>Compounds, Grinding. Oakite Products, Inc.</p> <p>Compounds, Paint Removing. Oakite Products, Inc.</p> <p>Compounds, Rust Proofing. Oakite Products, Inc.</p> <p>Compressors, Air. Ingersoll-Rand Co. Westinghouse Air Brake Co.</p> <p>Worthington Pump & Machinery Corp.</p> <p>Concrete Floor Slabs. Federal American Cement Tile Co.</p> <p>Concrete Reinforcement. American Steel & Wire Co. Carnegie Steel Co. Ryerson & Son, Jos. T.</p> <p>Concrete Roofing, Tile. Federal American Cement Tile Co.</p> <p>Condensers. Ingersoll-Rand Co.</p> <p>Condensing Apparatus. Ingersoll-Rand Co. Worthington Pump & Machinery Corp.</p> <p>Conduit, Rigid. Aluminum Co. of America.</p> <p>Conduits, Metallic Flexible. Barco Mfg. Co. Franklin Railway Supply Co., Inc.</p> <p>Graybar Electric Co. Vapor Car Heating Co., Inc.</p> <p>Conduit, Underground. Graybar Electric Co. Johns-Manville Corp.</p> <p>Connections, Lever. National Malleable & Steel Castings Co.</p> <p>Connections, Truck. National Malleable & Steel Castings Co.</p> <p>Connections, Truck Lever. Schaefer Equipment Co.</p> <p>Contraction Joint. General Railway Signal Co.</p> <p>Control Devices, Train Speed. Union Switch & Signal Co.</p> <p>Control, Locomotive. Valve Pilot Co.</p> <p>Controllers, Electric. General Electric Co. Westinghouse Electric & Mfg. Co.</p> <p>Conveying Machinery. American Bridge Co. Industrial Brownhoist Corp. Milwaukee Electric Crane & Hoist Corp.</p> <p>Corrugated Sheet. Aluminum Co. of America.</p> <p>Conveyor, Ash—(See Coal Ore and Ash Handling Mach.)</p> <p>Coupler Pockets—(See Draft Yokes.)</p>	<p>Coupler Yokes. Bettendorf Co., The. Gould Coupler Co. Symington Co., The.</p> <p>Couplers. American Steel Foundries. Buckeye Steel Castings Co. Franklin Railway Supply Co., Inc. Gould Coupler Co., The. McConway & Torley Co. National Malleable & Steel Castings Co. Standard Coupler Co. Westinghouse Air Brake Co.</p> <p>Couplings, Hose. Fort Pitt Malleable Iron Co. Gold Car Heating & Lighting Co. Ingersoll-Rand Co. Vapor Car Heating Co., Inc. Westinghouse Air Brake Co.</p> <p>Cranes, Ballast Cleaning. American Hoist & Derrick Co. Industrial Brownhoist Corp. Ohio Locomotive Crane Co.</p> <p>Cranes, Barge. Industrial Brownhoist Corp. Ohio Locomotive Crane Co.</p> <p>Cranes, Bracket. Shepard-Niles Crane & Hoist Corp.</p> <p>Cranes, Crawler. American Hoist & Derrick Co. Industrial Brownhoist Corp.</p> <p>Cranes, Crawling Shovels and Draglines. American Hoist & Derrick Co. Industrial Brownhoist Corp.</p> <p>Cranes, Diesel. American Hoist & Derrick Co. Industrial Brownhoist Corp. Ohio Locomotive Crane Co.</p> <p>Cranes, Electric Traveling. American Hoist & Derrick Co. Industrial Brownhoist Corp. Milwaukee Electric Crane & Hoist Corp.</p> <p>Cranes, Gantry. Industrial Brownhoist Corp. Milwaukee Electric Crane & Hoist Corp. Ohio Locomotive Crane Co. Shepard-Niles Crane & Hoist Corp.</p> <p>Cranes, Gasoline. American Hoist & Derrick Co. Industrial Brownhoist Corp. Ohio Locomotive Crane Co.</p> <p>Cranes, Grab Bucket. American Hoist & Derrick Co. Milwaukee Electric Crane & Hoist Corp.</p> <p>Cranes, Handpower. American Hoist & Derrick Co. Shepard-Niles Crane & Hoist Corp.</p> <p>Cranes, Jib. Industrial Brownhoist Corp. Milwaukee Electric Crane & Hoist Corp. Worthington Pump & Machinery Corp.</p> <p>Cranes, Locomotive. American Hoist & Derrick Co. Industrial Brownhoist Corp. Ohio Locomotive Crane Co.</p> <p>Cranes, Overhead. Milwaukee Electric Crane & Hoist Corp. Shepard-Niles Crane & Hoist Corp.</p> <p>Cranes, Pillar. American Hoist & Derrick Co. Industrial Brownhoist Corp. Milwaukee Electric Crane & Hoist Corp.</p> <p>Cranes, Portable. American Hoist & Derrick Co.</p>
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- Cranes, Transfer.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
- Cranes, Traveling.
Milwaukee Electric Crane & Hoist Corp.
Shepherd-Niles Crane & Hoist Corp.
- Cranes, Wharf.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
- Cranes, Wrecking.
Industrial Brownhoist Corp.
- Crank Pins—(See Pins, Cranks).
- Creosotes.
American Creosoting Co.
Century Wood Preserving Co.
International Creosoting & Constr. Co.
Jennison Wright Co.
- Cribbing Units.
Federal American Cement Tile Co.
- Cross Arms, Treated.
American Creosoting Co.
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
- Cross Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
- Cross Ties, Steel.
Bethlehem Steel Co.
- Crossheads & Shoes.
Baldwin Locomotive Wks.
Barco Mfg. Co.
International Creosoting & Construction Co.
- Crossing Signals & Signs.
Railroad Supply Co.
- Crossings—(See Frogs and Crossings).
- Crossings, Pavement.
Carey Co., The Philip
- Crushers, Coal.
American Sheet & Tin Plate Co.
- Culverts.
Armco Railroad Sales Co.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.
Toncan Culvert Manufacturers' Association.
- Culverts Corrugated.
Armco Culvert Manufacturers' Association.
Republic Steel Corp.
- Culverts, Paved Invert.
Armco Culvert Mfrs. Assoc.
- Cupolas, Foundry.
Hammett, H. G.
- Cups, Oil.
Prime Manufacturing Co., The.
Westinghouse Air Brake Co.
- Curtains & Fixtures, Car Window.
Pantasote Co., Inc., The.
- Curtain Material, Car.
Ryerson & Son, Jos. T.
- Curtains, Cab.
Lehon Co., The
- Cutting & Welding Apparatus.
Oxweld Railroad Service Co.
Westinghouse Elec. & Mfg. Co.
- Cut-Off Indicators & Records.
National Tube Co.
Valve Pilot Co.
- Cylinders, Air Brake.
Westinghouse Air Brake Co.
- Cylinders, Cast Steel Locomotive.
General Steel Castings Corp.
- Cylinders, Oxy-Acetylene.
Oxweld Railroad Co., The
- Deoxidizers.
Q & C Co., The.
Vanadium Corp. of America.
- Derricks.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
- Diesel Electric Power Plants.
Fairbanks-Morse & Co.
Westinghouse Elec. & Mfg. Co.
- Dirt Collectors.
Westinghouse Air Brake Co.
- Disinfectants.
West Disinfecting Co.
- Dispatching Systems.
General Railway Signal Co.
Union Switch & Signal Co.
- Ditchers.
American Hoist & Derrick Co.
Jordan Co., O. F.
- Ditching Machinery.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
- Door Fixtures—(See Fixtures Car Door).
- Doors, Car.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
Wine Railway Appliance Co.
- Doors, Folding, Rolling and Sliding.
Kinnear Manufacturing Co.
- Doors, Locomotive Firebox.
Franklin Railway Supply Co., Inc.
- Doors, Steel.
Kinnear Manufacturing Co.
- Doors, Rolling, Steel.
Kinnear Mfg. Co.
- Doors, Wood.
Kinnear Mfg. Co.
- Draft Arms.
American Steel Foundries.
Birdsboro Steel Foundry & Mach. Co.
Bradford Corporation.
Symington Co., The.
Universal Draft Gear Attachment Co.
- Draft Gear Attachments.
Symington Co., The.
- Draft Gears.
American Steel Foundries.
Bradford Corporation.
Cardwell-Westinghouse Co.
Edgewater Steel Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Union Draft Gear Co.
Universal Draft Gear Attachment Co.
- Draft Yokes.
American Steel Foundries.
Bettendorf Co., The.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
McConway & Torley Co.
Miner, W. H.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Steel Car Forge Co.
Symington Co., The.
Universal Draft Gear Attachment Corp.
- Drainage Gates.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.
- Drains, Perforated Iron.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.
- Drawbar Centering Device.
Gould Coupler Co., The.
Miner, W. H.
- Drawbars, Unit Safety.
Franklin Railway Supply Co., Inc.
Industrial Brownhoist Corp.
- Dredging Machinery.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
- Drilling Machines.
Sellers & Co., Inc., Wm.
Drilling Machines, Bonding.
Railroad Supply Co.
- Drilling Machines, Pneumatic.
Ingersoll-Rand Co.
- Drilling Machines, Rock.
General Electric Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
- Drilling Machines, Upright and Radial.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.
- Drills.
Ingersoll-Rand Co.
- Drills, Close Corner.
Ingersoll-Rand Co.
- Drills, Concrete.
Ingersoll-Rand Co.
- Drills, Steel Rock and Steel Sharpened.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
- Drills, Track & Bending.
Bird-Archer Co., The.
Ingersoll-Rand Co.
- Drinking Cups.
U. S. Envelope Co.
- Drive Gas Electric Coaches.
General Electric Co.
- Drive Gas Electric Locomotives.
Westinghouse Elec. & Mfg. Co.
- Driving Boxes (Extended Main).
Franklin Railway Supply Co., Inc.
- Drop Door Mechanism.
Wine Railway Appliance Co.
- Dynamos—(See Generators Electric).
- Electrical Cable Accessories.
General Electric Supply Corp.
- Electric Cables.
Anaconda Wire & Cable Co.
General Electric Supply Corp.
- Electrical Instruments.
Electric Service Supplies Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.
- Electrical Supplies.
General Electric Co.
General Electric Supply Corp.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.
- Electrification, Railroad.
Battey & Kipp.
General Electric Co.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.
- Electric Heaters.
General Electric Supply Corp.
- Electrical Insulation.
General Cable Corp.
General Electric Supply Corp.
- Electrical Porcelain Insulators.
General Electric Supply Corp.
- Electric Motors.
General Electric Supply Corp.
- Electric Rivet Heaters.
General Electric Supply Corp.
- Electric Switches.
General Electric Supply Corp.
- Enamels.
du Pont de Nemours & Co., Inc., E. I.
Sherwin-Williams Co.
- End Frames, Cast Steel.
Passenger Car
General Steel Castings Corp.
- Ends, Steel.
Hutchins Car Rfg. Co.
Union Metal Products Co.
- Engineers, Consulting, Civil, Elec., Hydraulic, Mechanical.
Battey & Kipp.
Hunt Co., Robt. W.
Muhlfield, John E.
United Engineers & Constructors, Inc.
- Engineers, Contracting.
Battey & Kipp.
United Engineers & Constructors, Inc.
- Engineers and Contractors.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfield, John E.
United Engineers & Constructors, Inc.
- Engineers, Construction.
Battey & Kipp.
Roberts & Schaefer Co.
United Engineers & Constructors, Inc.
- Engineers, Inspection.
Gulick-Henderson Co.
Hunt Co., Robert W.
Muhlfield, John E.
Pittsburgh Testing Laboratory.
United Engineers & Constructors, Inc.
- Engineers, Valuation.
Hunt Co., Robert W.
United Engineers & Constructors, Inc.
- Engines, Crude & Fuel Oil.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
- Engines, Diesel.
Worthington Pump & Machinery Corp.
- Engines, Gas.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.
- Engines, Gas & Gasoline.
American Car & Foundry Motors Co.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
- Engines, Hoisting.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
- Excavators.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
- Exhaust & Heater Pipe.
Union Asbestos & Rubber Co.
- Exhaust & Ventilating Fans.
General Electric Supply Corp.
- Expanders, Tube.
Ryerson & Son, Joseph T.
- Explosives.
American Steel & Wire Co.
du Pont de Nemours & Co., Inc., E. I.
- Fans, Exhaust & Ventilating.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.
- Fasteners, Car Door.
Camel Sales Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.
- Feed Water Heater Systems.
Bird-Archer Co., The.
Coffin, Jr., Co., The J. S.
Worthington Pump & Machinery Corp.
- Fencing Wire—(See Wire Fence).
- Fence Posts, Treated.
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
- Ferro Alloys.
Vanadium Corp. of America.
- Ferro, Chromium.
Vanadium Corp. of America.
- Ferro Molybdenum.
Electro Metallurgical Sales Corp.
Vanadium Corp. of America
- Ferro Silicon.
Vanadium Corp. of America.
- Ferro Tungsten.
Vanadium Corp. of America.
- Ferro Vanadium.
Vanadium Corp. of America.
- Filters, Air.
Westinghouse Air Brake Co.
- Filters, Water & Industrial.
Graver Tank & Mfg. Corp.
- Filtration Plants, (Water).
Graver Tank & Mfg. Corp.
- Fireboxes.
American Locomotive Co.
Baldwin Locomotive Works
- Fire Fighting & Protection Equipment.
Johns-Manville Corp.
- Fittings, Air Brakes.
Westinghouse Air Brake Co.
- Fittings, Steam.
Vapor Car Heating Co., Inc.
- Fixtures, Car Door.
Camel Sales Co.
Chicago Railway Equipment Co.
- Miner, W. H.
National Malleable & Steel Castings Co.
- Flangers, Snow.
Q & C Co., The.
- Floodlights.
General Electric Supply Corp.
Graybar Electric Co.
Oxweld Railroad Service Co.
- Pyle-National Co.
Symington Co., The.
Westinghouse Elec. & Mfg. Co.
- Floodlights, Acetylene.
Oxweld Railroad Service Co., The.
- Flooring.
Carey & Co., Philip, The.
Jennison-Wright Co.
Johns-Manville Corp.
- Flooring, Car.
Tucio Products Corp.
- Flooring, Coach.
Tucio Products Corp.
- Flooring, Composition.
Johns-Manville Corp.
Tucio Products Corp.
- Flooring, Treated.
Central Coal & Coke Co.
Century Wood Preserving Co.
Curtin-Howe Corp.
- Floor Plates, Steel.
Carnegie Steel Co.
Illinois Steel Co.
- Floor Slabs, Concrete.
American Cement Tile Mfg. Co.
- Flue Cleaners—(See Cleaners, Flue).
- Flue Cutters—(See Cutters, Flue).
- Flues, Boiler—(See Tubes Boiler).
- Flue Shop Equipment.
Ryerson & Son, Joseph T.
- Forges, Rivet Heating.
Ryerson & Son, Joseph T.
- Forging Hammers.
Industrial Brownhoist Corp.
- Forgings.
American Bridge Co.
American Steel Foundries.
Bethlehem Steel Company.

- Brill Co., The J. G.
Carnegie Steel Co.
Edgewater Steel Co.
General Railway Signal Co.
Gould Coupler Co., The
Illinois Steel Co.
Midvale Co., The
Mt. Vernon Car Mfg. Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Steel Car Forge Co.
Universal Draft Gear Attachment Co.
- Forgings, Drop.
Brill Co., The J. G.
General Railway Signal Co.
Steel Car Forge Co.
Union Switch & Signal Co.
- Forgings, Monel Metal.
International Nickel Co., The.
- Foundry Supplies.
Bird-Archer Co., The
- Frames, Cast Steel, Locomotive
General Steel Castings Corp.
- Frames, Locomotive.
American Steel Foundries.
American Locomotive Co.
Baldwin Locomotive Works
Birdsboro Steel Foundry & Mach. Co.
Ohio Steel Foundry Co., The.
Union Steel Casting Co.
- Frames, Truck.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Buckeye Steel Castings Co.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Pressed Steel Car Co.
Pyle-National Co., The
Symington Co., The
- Frames, Vanadium.
American Locomotive Co.
Baldwin Locomotive Works
Birdsboro Steel Foundry & Mach. Co.
Union Steel Casting Co.
- Frogs and Crossings.
Bethlehem Steel Company
Ramapo Ajax Corp.
- Fulcrums, Brake Beam.
American Steel Foundries.
Brill Co., The J. G.
Chicago Railway Equipment Co.
National Malleable & Steel Castings Co.
- Furnaces, Electric.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
- Furnaces, Gasoline.
Railroad Supply Co.
- Furnaces, Rivet Heating — (See Forges, Rivet Heating).
- Furniture.
Aluminum Co. of America.
- Gage Testers—(See Testers Gage).
- Gages, Air.
Westinghouse Air Brake Co.
- Gages, Oxy-Acetylene.
Oxweld Railroad Service Co., The.
- Gages, Steam.
Ashton Valve Co.
- Gages, Tire.
Schrader's Son, Inc., A.
- Gages, Wheel Press Recording.
Ashton Valve Co.
- Gaskets.
Westinghouse Air Brake Co.
- Gasoline.
Ethyl Gasoline Corp.
- Gear Blanks, Rolled Steel.
Edgewater Steel Co.
Standard Steel Works Co.
- Gears and Pinions.
American Steel Foundries.
Westinghouse Elec. & Mfg. Co.
- Gears, Silent.
General Electric Co.
Westinghouse Elec. & Mfg. Co.
- Gears, Valve — (See Valve Gears).
- Generators, Acetylene.
Oxweld Railroad Service Co.
- Generators, Car Lighting.
Safety Car Heating & Lighting Co.
- Generators, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Sunbeam Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.
- Goggles, Welding.
Oxweld Railroad Service Co., The.
- Graders, Elevating.
Western Wheeled Scraper Co.
- Graphite Penetrating Oil.
Alemitte Mfg. Corp.
- Grapples, Wood.
Industrial Brownhoist Corp.
- Grate Bars.
Q & C Co., The.
- Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.
- Grates.
Firebar Corp.
- Grease Forming Machines.
Franklin Railway Supply Co., Inc.
- Grey Iron.
American Brake Shoe & Foundry Co.
- Grinders, Internal.
Micro Machine Co.
- Grinders, Portable Crank Pin.
Micro Machine Co.
- Grinding Machines.
Sellers & Co., Inc., Wm.
- Grinding Machines, Portable.
Ingersoll-Rand Co.
- Ryerson & Son, Inc., Joseph T.
- Guard Rails, Treated.
Curtin-Howe Corp.
- International Creosoting & Construction Co.
- Guard Rails, Foot Guard.
Q & C Co., The.
- Guard Rails (One Piece).
Bethlehem Steel Company.
- Ramapo Ajax Corp.
- Guard Switch Point.
Q & C Co., The.
- Guards, Cattle.
American Bridge Co.
- Guards, Dust.
Gould Coupler Co., The.
- Symington Co., The.
- Hair Felt.
Johns-Manville Corp.
- Hammers, Pneumatic.
Ingersoll-Rand Co.
- Hammers, Riveting.
Ingersoll-Rand Co.
- Hammers, Steam.
Industrial Brownhoist Corp.
- Sellers & Co., Inc., Wm.
- Hand Brakes—(See Brakes, Hand).
- Hangers, Ball Bearing.
S. K. F. Industries, Inc.
- Hand Rails & Fittings.
Aluminum Co. of America.
- Hangers, Bottom Rod Safety.
Chicago Railway Equipment Co.
- Hangers, Car Door—(See Fixtures, Car Door).
- Headlight Repair Parts.
Electric Service Supplies Co.
- Pyle-National Co.
- Sunbeam Electric Mfg. Co.
- Headlights, Electric.
General Electric Co.
- Pyle-National Co., The.
- Sunbeam Electric Mfg. Co.
- Westinghouse Electric & Mfg. Co.
- Headlights, Reflectors & Cases.
Pyle-National Co.
- Sunbeam Electric Mfg. Co.
- Heaters, Electric.
Gold Car Heating & Lighting Co.
- Westinghouse Electric & Mfg. Co.
- Heaters, Electric Rivet.
American Hoist & Derrick Co.
- Heaters, Feedwater.
Graver Tank & Mfg. Corp.
- Heaters, Feedwater Locomotive.
Coffin Co., Jr., The J. S.
Superheater Company, The.
- Worthington Pump & Machinery Corp.
- Heaters, Feed Water, Stationary.
Brill Co., The J. G.
- Worthington Pump & Machinery Corp.
- Heating & Ventilating Apparatus.
Gold Car Heating & Lighting Co.
- Vapor Car Heating Co., Inc.
- Westinghouse, Electric & Mfg. Co.
- Heating Equipment, Car.
Gold Car Heating & Lighting Co.
- Safety Car Htg. & Ltg. Co.
- Vapor Car Heating Co., Inc.
- Wine Railway Appliance Co.
- Heating Systems, Car (Electric and Steam).
Gold Car Heating & Lighting Co.
- Safety Car Htg. & Ltg. Co.
- Vapor Car Heating Co., Inc.
- Wine Railway Appliance Co.
- High Temperature Cements.
Carey & Co., Philip, The.
- Highway Crossing Protection Devices.
American Bridge Co.
- Franklin Railway Supply Co., Inc.
- Railroad Supply Co.
- Hoists, Chain.
Milwaukee Electric Crane & Hoist Corp.
- Ryerson & Son, Jos. T.
- Hoists, Electric.
American Hoist & Derrick Co.
- Milwaukee Electric Crane & Hoist Corp.
- Hoists, Pneumatic.
Ingersoll-Rand Co.
- Hoists, Second-Hand.
Hyman-Michaels Co.
- Hoisting Machinery.
American Hoist & Derrick Co.
- Industrial Brownhoist Corp.
- Milwaukee Electric Crane & Hoist Corp.
- Hooks, Wrecking.
National Malleable & Steel Castings Co.
- Horns, Pneumatic.
Westinghouse Air Brake Co.
- Hose, Air, Steam, Etc.
Ingersoll-Rand Co.
- Westinghouse Air Brake Co.
- Worthington Pump & Machinery Corp.
- Hose, Oxy-Acetylene.
Oxweld Railroad Service Co., The.
- Hose, Tender.
Westinghouse Air Brake Co.
- Ice Cutters.
Jordan Co., O. F.
- Incandescent Lamps.
General Electric Supply Corp.
- Indicators, Speed & Cut-off.
Valve Pilot Co.
- Ingots.
Birdsboro Steel Foundry & Mach. Co.
- Carnegie Steel Co.
- Edgewater Steel Co.
- Illinois Steel Co.
- McConway & Torley Co.
- Standard Steel Works Co.
- Injectors, Exhaust Steam.
Sellers & Co., Inc., Wm.
- Superheater Co., The.
- Inspection of Material and Equipment—(See Engineers, Inspection).
- Insulated Wire.
Anaconda Wire & Cable Co.
- General Electric Supply Corp.
- Insulation, Car.
Carey Co., Philip, The.
- Insulation, Car Bldg.
Carey Co., Philip, The.
- Johns-Manville Corp.
- Lehon Co., The.
- Tuco Products Corp.
- Union Asbestos & Rubber Co.
- Insulation, Electrical.
General Electric Co.
- Westinghouse Elec. & Mfg. Co.
- Insulation, Exhaust & Heater Pipe.
Carey Co., Philip, The.
- Johns-Manville Corp.
- Tuco Products Corp.
- Union Asbestos & Rubber Co.
- Insulation, Heat.
Carey Co., Philip, The.
- Miner, W. H.
- Insulation Tape.
General Electric Supply Corp.
- Insulators, Electrical, Porcelain.
Graybar Electric Co.
- Westinghouse Elec. & Mfg. Co.
- Interlocking Plant Equipment.
General Railway Signal Co.
- Union Switch & Signal Co.
- Iron Chain.
Falls Hollow Staybolt Co.
- Lockhart Iron & Steel Co.
- Iron, Charcoal.
Bethlehem Steel Co.
- Ewald Iron Co.
- Falls Hollow Staybolt Co.
- Lockhart Iron & Steel Co.
- Iron, Engine Bolt.
Lockhart Iron & Steel Co.
- Iron, Forging Billets.
Lockhart Iron & Steel Co.
- Iron, Hollow Staybolt.
Falls Hollow Staybolt Co.
- Ryerson & Son, Joseph T.
- Iron, Hollow Staybolt Bars.
Bethlehem Steel Co.
- Falls Hollow Staybolt Co.
- Ryerson & Son, Joseph T.
- Iron, Pig.
Bethlehem Steel Co.
- Iron, Refined.
Ewald Iron Co.
- Falls Hollow Staybolt Co.
- Lockhart Iron & Steel Co.
- Reading Iron Co.
- Ryerson & Son, Joseph T.
- Iron, Staybolt — (See also Staybolts).
Ewald Iron Co.
- Falls Hollow Staybolt Co.
- Lockhart Iron & Steel Co.
- Reading Iron Co.
- Ryerson & Son, Jos. T.
- Jacking, Locomotive.
Carey Co., Philip, The.
- Johns-Manville Corp.
- Jacks, Smoke.
Carey Co., Philip, The.
- Johns-Manville Corp.
- Joints, Air Reservoir.
Barco Mfg. Co.
- Franklin Railway Supply Co., Inc.
- Joints, Blow Off Line (Roundhouse).
Barco Mfg. Co.
- Franklin Railway Supply Co., Inc.
- Joints, Coach and Coach Yard.
Barco Mfg. Co.
- Franklin Railway Supply Co., Inc.
- Joints, Flexible.
Franklin Railway Supply Co., Inc.
- Vapor Car Heating Co., Inc.
- Joints, Flexible Ball.
Barco Mfg. Co.
- Joints, Rail.
American Steel Foundries.
- Carnegie Steel Co.
- Illinois Steel Co.
- Q & C Co., The.
- Rail Joint Co.
- Union Switch & Signal Co.
- Joints, Steam, Air & Liquid.
Barco Mfg. Co.
- Franklin Railway Supply Co., Inc.
- Vapor Car Heating Co., Inc.
- Joints, Swing.
Barco Mfg. Co.
- Vapor Car Heating Co., Inc.
- Journal Boxes and Lids.
Allegheny Steel Co.
- American Steel Foundries.
- Brill Co., The J. G.
- Gould Coupler Co., The.
- Hunt-Spiller Mfg. Corp.
- National Malleable & Steel Castings Co.
- Fullman Car & Mfg. Corp.
- Railway Steel Spring Co.
- Symington Co., The.
- Union Spring & Mfg. Co.
- Journal Oilers, Car & Locomotive.
Ardeo Mfg. Co.
- Keys, Brake Shoes.
Bradford Corporation.
- Mt. Vernon Car Mfg. Co.
- Steel Car Forge Co.
- Union Spring & Mfg. Co.
- Knuckles Emergency.
Q & C Co., The.
- Laboratories, Testing.
Hunt Co., Robert W.
- Pittsburgh Testing Laboratory.
- Lacquers.
General Electric Supply Corp.
- Sherwin-Williams Co.
- Ladders, Steel Car.
Wine Railway Appliance Co.
- Lagging, Locomotive.
Carey & Co., Philip, The.
- Johns-Manville Corp.
- Lamps, Incandescent.
General Electric Co.
- Graybar Electric Co.
- Westinghouse Elec. & Mfg. Co.
- Lamps, Inspector's.
Oxweld Railroad Service Co., The.
- Lath, Metal.
Armco Railroad Sales Co.
- Truscon Steel Co.
- Lathes, Axle.
Sellers & Co., Inc., Wm.
- Lathes, Engine.
Ryerson & Son, Joseph T.
- Lathes, Wheel.
Sellers & Co., Inc., Wm.
- Lead, White.
National Lead Co.
- Lighting Equipment, Car.
Electric Storage Battery Co.
- Safety Car Htg. & Ltg. Co.
- Lighting Fixtures and Systems.
General Electric Supply Corp.
- Graybar Electric Co.
- Pyle-National Co.
- Safety Car Htg. & Ltg. Co.
- Lighting Plants, Gas, Electric.
Pyle-National Co., The.
- Sunbeam Electric Mfg. Co.
- Lightning Arresters.
General Electric Supply Corp.
- Line Material.
Graybar Electric Co.
- Westinghouse Elec. & Mfg. Co.
- Lock Nuts—(See Nut Locks).
- Locomotive Jacket Sheets.
Armco Railroad Sales Co.
- Locomotive Water Conditioners.
Bird-Archer Co., The.
- Locomotives, Contractors.
American Locomotive Co.
- Baldwin Locomotive Works.
- Lima Locomotive Works.
- Locomotives, Electric.
American Locomotive Co.
- Baldwin Locomotive Works.
- General Electric Co.
- Westinghouse Elec. & Mfg. Co.
- Locomotives, Gasoline.
Baldwin Locomotive Works.
- Locomotives, Gas-Electric.
Electro Motive Co.
- Locomotives, Geared.
Lima Locomotive Works.

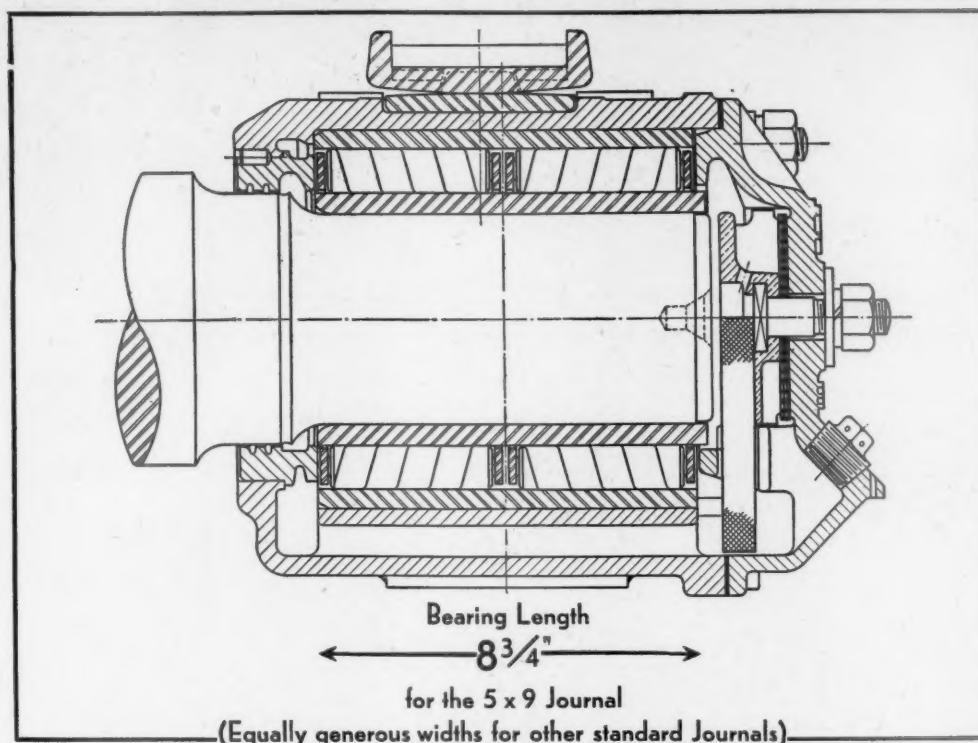
Locomotives, Industrial. American Locomotive Co. Baldwin Locomotive Works. General Electric Co. Lima Locomotive Works. Westinghouse Elec. & Mfg. Co.	Motors, Electric. Fairbanks-Morse & Co. General Electric Co. Graybar Electric Co. Westinghouse Elec. & Mfg. Co.	Paint Spraying Equipment. De Vibiss Mfg. Co., The.	Platforms, Cast Steel, Passenger Car. General Steel Castings Corp.	Pump Rods, Monel Metal. International Nickel Co., The.
Locomotives, Mine. American Locomotive Co. Baldwin Locomotive Works. General Electric Co. Lima Locomotive Works. Westinghouse Elec. & Mfg. Co.	Motors & Generators. Fairbanks-Morse & Co.	Paints. du Pont de Nemours & Co., Inc., E. I. National Lead Co. Sherwin-Williams Co.	Plows, Railroad and Grading. Western Wheeled Scraper Co.	Pump Shafts, Monel Metal. International Nickel Co., The.
Locomotives, Oil Engine, Electric Driven. American Locomotive Co. Baldwin Locomotive Works. General Electric Co. Ingersoll-Rand Co. Westinghouse Elec. & Mfg. Co.	Moulding. Aluminum Co. of America.	Paper, Carbon. Remington-Rand Business Service	Plows, Snow. American Locomotive Co. Brill Co., The J. G. Clark Tractor Co. Jordan Co., O. F. Q & C Co., The.	Pumps, Hydraulic. Ingersoll-Rand Co. Worthington Pump & Machinery Corp.
Locomotives, Rebuilt. American Locomotive Co.	Multiple V Belt Drives. Worthington Pump and Machinery Corp.	Paper, Sheathing. Carey & Co., Philip, The.	Plush, Mohair. Chase & Co., L. C. Massachusetts Mohair Plush Co.	Pumps & Pumping Machinery. Fairbanks-Morse & Co. Ingersoll-Rand Co. Westinghouse Air Brake Co. Worthington Pump & Machinery Corp.
Locomotives, Repair Parts. American Locomotive Co. Baldwin Locomotive Works. Lima Locomotive Works.	Nails. American Steel & Wire Co. Reading Iron Co. Ryerson & Son, Joseph T.	Pavement Breakers. Ingersoll-Rand Co.	Pneumatic Tools. Ingersoll-Rand Co.	Pumps, Vacuum. Ingersoll-Rand Co. Worthington Pump & Machinery Corp.
Locomotives, Second-Hand. Hyman-Michaels Co.	Nipples, Air Hose. Prime Manufacturing Co.	Pickling Equipment, Monel Metal. International Nickel Co., The.	Poles, Treated. American Creosoting Co. Central Coal & Coke Co. Century Wood Preserving Co.	Punching and Shearing Machines. Ryerson & Son, Joseph T.
Locomotives, Steam. American Locomotive Co. Baldwin Locomotive Works. Lima Locomotive Works.	Nozzles, Exhaust. Franklin Railway Supply Co., Inc.	Pile Drivers. American Hoist & Derrick Co.	Poles, Signal. Curtin-Howe Corp. General Railway Signal Co.	Pushers, Coal. Standard Stoker Co.
Locomotive Stokers. Standard Stoker Co.	Nozzles, Oxy-Acetylene Cutting. Oxweld Railroad Service Co., The.	Piling, Sheet Steel. American Bridge Co. Carnegie Steel Co.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Pyrometers, Superheated Steam. Superheater Co., The.
Locomotive Valve Pilot. Valve Pilot Co.	Nut Locks. Dardet Threadlock Corp.	Piling, Treated. American Creosoting Co. Century Wood Preserving Co.	Poles, Steel Tubular, Graybar Electric Co. National Tube Co.	Rail Anchors. Bethlehem Steel Co. F. & M. Co., The.
Lubricators, Driving Box. Franklin Railway Supply Co., Inc.	Nut Locks. Grip Nut Co.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Signal, Treated. American Creosoting Co.	Rail Bonds. American Steel & Wire Co.
Lubricators, Piston Rod. Q & C Co., The.	Nuts, Tank Hose. Prime Manufacturing Co., The.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Signal, Treated. American Creosoting Co.	Rail Braces — (See Braces, Rail).
Lumber, Asbestos. Carey & Co., Philip, The. Johns-Manville Corp.	Office Appliances. Remington-Rand Business Service	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Rail Cranes. American Hoist & Derrick Co.
Lumber, Treated. American Creosoting Co. Central Coal & Coke Co. Century Wood Preserving Co.	Oil-Electric Locomotives. American Locomotive Co. General Electric Co. Ingersoll-Rand Co. Westinghouse Elec. & Mfg. Co.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Rail Reclamation Equipment. Ryerson & Son, Joseph T.
Lubricators, Piston Rod. Q & C Co., The.	Oil Filtering & Storage Systems. Graver Tank & Mfg. Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Rail Road Shops. United Engineers & Constructors, Inc.
Lumber, Asbestos. Carey & Co., Philip, The. Johns-Manville Corp.	Oil, Linseed. National Lead Co.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Rail Splice Plates — (See Joints, Rail).
Lumber, Treated. American Creosoting Co. Central Coal & Coke Co. Century Wood Preserving Co.	Oil Plugs, Steam Chest. Franklin Railway Supply Co., Inc.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Railroad Structures — (See Engineers and Contractors; also Building).
Lubricators, Piston Rod. Q & C Co., The.	Oxy-Acetylene Apparatus. Oxweld Railroad Service Co., The.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Rails. Bethlehem Steel Co. Carnegie Steel Co. Hyman-Michaels Co.
Lubricators, Piston Rod. Q & C Co., The.	Oxygen. Oxweld Railroad Service Co., The.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Illinois Steel Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Inland Steel Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Ryerson & Son, Inc., Joseph T.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Tennessee Coal, Iron & Railroad Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Thomson Rail Corp.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Rills, Relaying. Hyman-Michaels Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Railway Signals. General Electric Supply Corp.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Rattan. Hale-Kilburn Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Hewwood-Wakefield Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Receivers, Air. Ingersoll-Rand Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Westinghouse Air Brake Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Recorders, Speed & Cut-off. Valve Pilot Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Rectifiers for Signal Work. General Electric Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Railroad Supply Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Union Switch & Signal Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Reducing Valves. Vapor Car Heating Co., Inc.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Reflectors, Headlight. Pyle-National Co., The
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Sunbeam Electric Mfg. Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Refrigerators. American Radiator Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Wine Railway Appliance Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Regulators, Oxy-Acetylene. Oxweld Railroad Service Co., The.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Relays. General Railway Signal Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Railroad Supply Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Union Switch & Signal Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	Westinghouse Elec. & Mfg. Co.
Lubricators, Piston Rod. Q & C Co., The.	Packing, Air Pump. Johns-Manville Corp.	Pilot Beams, Cast Steel. General Steel Castings Corp.	Poles, Steel Tubular. Graybar Electric Co. National Tube Co.	

Removers, Paint & Varnish. Oakite Products, Inc.	Scales. Fairbanks-Morse & Co.	Siding, Iron & Steel. Armco Railroad Sales Co.	Springs, Vanadium Steel. Pittsburgh Spring & Steel Co. Union Spring & Mfg. Co.	Superheaters. Superheater Co., The.
Repair Parts, Stoker. Standard Stoker Co. Q & C Company, The.	Scrapers, Wheeled and Drag. Western Wheeled Scraper Co.	Siding, Bldg., Car, Corrugated & Plain. Kinnear Mfg. Co. Armco Railroad Sales Co. American Sheet & Tin Plate Co. Inland Steel Co. Ryerson & Son., Inc., Joseph T.	Stacks, Steel. American Bridge Co. Graver Tank & Mfg. Corp.	Supports, Bottom Rod Safety. Chicago Railway Equipment Co.
Retorts, Creosoting. Graver Tank & Mfg. Corp.	Screens, Passenger Car. Tucos Products Corp.	Signal Accessories. Electric Storage Battery Co. General Electric Co. General Railway Signal Co. Graybar Electric Co. Railroad Supply Co. Union Switch & Signal Co. Westinghouse Elec. & Mfg. Co.	Stands, Switch & Target. Q & C Co., The.	Switch Boards. Graybar Electric Co. Johns-Manville Corp. Westinghouse Elec. & Mfg. Co.
Reverse Gear, Power. Barco Mfg. Co. Franklin Railway Supply Co., Inc.	Seats, Car. Brill Co., The J. G. Hale-Kilburn Co. Heywood-Wakefield Co. St. Louis Car Co. Seats, Coach. Brill Co., The J. G.	Siding, Corrugated & Plain. Carey & Co., Philip, The. Johns-Manville Corp.	Staybolts. American Locomotive Co. Ewald Iron Co. Falls Hollow Staybolt Co. Flannery Bolt Co. Ryerson & Son, Joseph T.	Switch Machines. General Railway Signal Co.
Rivet Cutters. Ingersoll-Rand Co.	Shafting. Falls Hollow Staybolt Co. Ryerson & Son, Joseph T. Sellers & Co., Inc., Wm. Standard Steel Works Co.	Signal Blades. General Railway Signal Co. Union Switch & Signal Co.	Staybolts, Hollow. Falls Hollow Staybolt Co. Ryerson & Son, Joseph T.	Switch Movements. Union Switch & Signal Co.
Riveters, Hydraulic. Birdsboro Steel Foundry & Mach. Co.	Shapers. Ryerson & Son, Joseph T.	Signals, Automatic Cab. General Railway Signal Co. Union Switch & Signal Co.	Steam Chests. Franklin Railway Supply Co., Inc.	Switch Ties, Treated. American Creosoting Co. Curtin-Howe Corp. International Creosoting & Construction Co. National Lumber & Creosoting Co.
Riveting Machines. Ingersoll-Rand Co.	Shapes, Pressed Steel. Pressed Steel Car Co. Sellers & Co., Inc., Wm.	Signals, Crossing. Union Switch & Signal Co.	Steam Enclosures, Corrugated Iron. Republic Steel Corp.	Switches, Electric. Electric Service Supplies Co. General Electric Co. Graybar Electric Co. Westinghouse Elec. & Mfg. Co.
Rivets. Inland Steel Co. Neely Nut & Bolt Co. Ryerson & Son, Joseph T. Pressed Steel Car Co. Russell, Burdall & Ward Bolt and Nut Co.	Shapes, Structural. Bethlehem Steel Co. Carnegie Steel Co. Illinois Steel Co. Inland Steel Co. Ryerson & Son, Joseph T.	Signals, Crossing Protection. General Railway Signal Co. Railroad Supply Co.	Steam Shovels. American Hoist & Derrick Co. Orton Crane & Shovel Co.	Switches & Switch Stands. Ramapo Ajax Corp.
Rods. Neely Nut & Bolt Co.	Sheds, Train. American Bridge Co. Inland Steel Co.	Signs, Highway Crossing. Railroad Supply Co.	Steel Alloy. Illinois Steel Co. Ryerson & Son, Joseph T. Republic Steel Corp. Standard Steel Works Co.	Syphons, Corrugated Iron. Armco Culvert Mfrs. Association. Republic Steel Corp.
Rolled Steel. Carnegie Steel Co.	Sheets, Black and Galvanized. Allegheny Steel Co. American Sheet & Tin Plate Co. Armco Railroad Sales Co. Inland Steel Co. Republic Steel Corp. Ryerson & Son, Joseph T.	Signs, Railway. General Electric Co. Union Switch & Signal Co.	Steel, Firebox. Carnegie Steel Co. Illinois Steel Co.	Syphons, Locomotive. Locomotive Firebox Co.
Roller Bearings (See Bearings, Roller).	Sheets, Blue Annealed. Allegheny Steel Co.	Silico Manganese. Vanadium Corp. of America	Steel, Open Hearth. Carnegie Steel Co. Illinois Steel Co.	Syphons, Locomotive, Boilers. Locomotive Firebox Co.
Rolls, Bending & Straightening. Birdsboro Steel Foundry & Mach. Co.	Sheets, Corrugated. American Sheet & Tin Plate Co. Armco Railroad Sales Co. Carey Co., Philip, The. Carnegie Steel Co. Johns-Manville Corp. Ryerson & Son, Joseph T.	Slabs, Concrete Floor. American Cement Tile Mfg. Co. Federal Cement Tile Co.	Steel Plate Construction. Graver Tank & Mfg. Corp.	Tables, Welding. Oxweld Railroad Service Co., The.
Roof Slabs, Concrete. Federal American Cement Tile Co.	Sheets, Corrugated and Plain. Inland Steel Co. Ryerson & Son, Joseph T.	Slag, Blast Furnace. Carnegie Steel Co.	Steel, Pressed Specialties. Hale-Kilburn Co.	Tables, Welding. Oxweld Railroad Service Co., The.
Roofing, Asbestos. Carey & Co., Philip, The. Johns-Manville Corp. Lehon Co., The	Sheets, Electrical. American Sheet & Tin Plate Co. Armco Railroad Sales Co. Republic Steel Corp. Ryerson & Son, Joseph T.	Slotting Machines. Sellers & Co., Inc., Wm.	Steel, Structural. American Bridge Co. Carnegie Steel Co. Graver Tank & Mfg. Corp. Illinois Steel Co. Inland Steel Co. Ryerson & Son, Joseph T.	Tamping Machines, Tie. Ingersoll-Rand Co.
Roofing, Buildings. Armco Railroad Sales Co. Carey Co., Philip, The. Lehon Co., The Johns-Manville Corp. Superior Sheet Steel Co., The (Division of Continental Steel Corp.)	Sheets, Iron & Steel. Armco Railroad Sales Co. Bethlehem Steel Co. Superior Sheet Steel Co., The (Division of Continental Steel Corp.)	Slotting Machines, Locomotive Cylinder. American Steel & Wire Co.	Steel, Tool. Illinois Steel Co. Midvale Co., The. Q & C Co., The. Ryerson & Son, Joseph T.	Tamping Outfits, Tie. Ingersoll-Rand Co.
Roofing, Car. Armco Railroad Sales Co. American Sheet & Tin Plate Co. Carey & Co., Philip, The. Hutchins Car Rfg. Co. Johns-Manville Corp. Lehon Co., The Superior Sheet Steel Co., The (Division of Continental Steel Corp.) Tucos Products Corp. Union Metal Products Co.	Sheets, Locomotive Jacket. American Sheet & Tin Plate Co. Armco Railroad Sales Co. Inland Steel Co. Ryerson & Son., Inc., Joseph T.	Sludge Removers. Bird-Archer Co., The.	Step Joints. Q & C Co., The Rail Joint Co.	Tanks, Acetylene, Gas. Oxweld Railroad Service Co., The.
Roofing, Tile. Federal American Cement Tile Co.	Sheets, Polished or Planished. Iron. Armco Railroad Sales Co. American Sheet & Tin Plate Co.	Soap, Liquid. West Disinfecting Co.	Steps, Car—(See Car Steps, Safety).	Tanks, Air, Gas, Oil and Water. Graver Tank & Mfg. Corp.
Roofing, Tile, Cement. Federal American Cement Tile Co.	Sheets, Steel. Armco Railroad Sales Co. The. Inland Steel Co. Ryerson & Son, Joseph T.	Snow Plows. Jordan Co., O. F.	Stokers, Locomotive. Standard Stoker Co.	Tanks, Water. American Bridge Co. American Locomotive Co. National Tube Co. Pressed Steel Car Co. Westinghouse Air Brake Co.
Roofing, Tin. American Sheet & Tin Plate Co.	Sherardising Plants. General Electric Co.	Solder. National Bearing Metals Corp. Ryerson & Son., Inc., Joseph T. Westinghouse Elec. & Mfg. Co.	Stokers, Mechanical. Westinghouse Elec. & Mfg. Co.	Tape, Insulation. Johns-Manville Corp. Okonite Co., The. Westinghouse Elec. & Mfg. Co.
Rope, Wire — (See Wire Rope).	Shop Calling Systems—(See Systems, Communication)	Splice Bars, Angle. Carnegie Steel Co. Illinois Steel Co. Inland Steel Co. Ryerson & Son, Joseph T.	Stoker Repair Parts. Standard Stoker Co.	Taps, Staybolt. Ryerson & Son, Joseph T.
Rust Preventatives. Dearborn Chemical Co. Oakite Products, Inc.	Shops, Railroad—(See Buildings, Iron, Steel and Steel Concrete).	Spikes. American Steel & Wire Co. Bethlehem Steel Co. Illinois Steel Co. Inland Steel Co. Ryerson & Son, Joseph T.	Storm Sewers, Corrugated Iron. Armco Culvert Mfrs. Assoc. Republic Steel Corp.	Tele. & Tele. Wire. Anaconda Wire & Cable Co. General Electric Supply Corp.
Safe Ends. National Tube Co.	Shovels & Draglines. American Hoist & Derrick Co. Industrial Brownhoist Corp.	Spreaders, Ballast. Jordan Co., O. F.	Strainer, Air. Westinghouse Air Brake Co.	Terminals, Railroad. United Engineers & Constructors, Inc.
Sand Drying Plants. Roberts & Schaefer Co.	Shovels, Gasoline & Electric. American Hoist & Derrick Co.	Spring, Plates or Seats. Allegheny Steel Co. National Malleable & Steel Castings Co. Union Spring & Mfg. Co.	Strainers, Tank Hose. Prime Mfg. Co., The.	Testers, Boiler. Sellers & Co., Inc., Wm.
Sanitary Products. West Disinfecting Co.	Shovels, Steam, Gasoline & Electric. American Hoist & Derrick Co.	Stringers, Bridge, Treated. American Creosoting Co. Central Coal & Coke Co. Century Wood Preserving Co. Curtin-Howe Corp. International Creosoting & Construction Co. National Lumber & Creosoting Co.	Stream Enclosures, Corrugated Iron. Armco Culvert Mfrs. Assoc.	Testers, Gage. Ashton Valve Co.
Sash Balances. Tucos Products Co.	Siding, Shop Equipment. Ryerson & Son, Joseph T.	Structural Shapes, Rolled Shapes. Carnegie Steel Co.	Strainers, Air. Westinghouse Air Brake Co.	Testers, Rail. Sperry Products, Inc.
Saws, Circular Metal. Ryerson & Son, Joseph T.				Thermostats. Gold Car Heating & Lighting Co. Vapor Car Heating Co., Inc.
Saws, High Speed, Friction. Ryerson & Son, Joseph T.				Throttles. American Throttle Co.
Saws, Portable Rail. Industrial Brownhoist Corp Q & C Co., The.				

<p>Tie Plates. Bethlehem Steel Co. Illinois Steel Co. Railroad Supply Co.</p> <p>Ties, Creosoted. International Creosoting & Construction Co. Jennison-Wright Co. National Lumber & Creosoting Co.</p> <p>Ties, Steel. American Bridge Co. Bethlehem Steel Co. Carnegie Steel Co.</p> <p>Ties, Treated. American Creosoting Co.</p> <p>Ties, Wood, Treated. American Creosoting Co. Curtin-Howe Corp. International Creosoting & Construction Co.</p> <p>Tile, Cement, Concrete. Federal American Cement Tile Co.</p> <p>Timber, Treated. Central Lumber & Coke Co. Curtin-Howe Corp.</p> <p>Tires. Firestone Tire & Rubber Co. General Tire & Rubber Co. Goodyear Tire & Rubber Co. Goodrich Rubber Co., B. F.</p> <p>Timber, Treated. American Creosoting Co. Century Wood Preserving Co. Curtin-Howe Corp. International Creosoting & Construction Co. National Lumber & Creosoting Co.</p> <p>Tires, Steel. Edgewater Steel Co. Midvale Co., The. Railway Steel Spring Co. Standard Steel Works Co.</p> <p>Tools, High Speed Steel. Bethlehem Steel Co. Bird-Archer Co., The.</p> <p>Towers, Floodlight. Pyle-National Co.</p> <p>Track Skates. Q & C Co., The.</p> <p>Tractors. Caterpillar Tractor Co. Elwell-Parker Electric Co. Industrial Lumber Co. International Creosoting & Construction Co.</p> <p>Tractors, Industrial. Elwell-Parker Electric Co. International Harvester Co.</p> <p>Tractors, Turntable. Nichols & Bros., Geo. P.</p> <p>Train Control Systems. General Railway Signal Co. Union Switch & Signal Co.</p> <p>Tramways, Wire Rope. American Steel & Wire Co.</p> <p>Transfer Tables. American Bridge Co. Industrial Brownhoist Corp. Nichols & Bro., Geo. P.</p> <p>Transformers. General Electric Supply Corp. Railroad Supply Co. Westinghouse Elec. & Mfg. Co.</p> <p>Trap Doors. Edwards Co., O. M.</p> <p>Trap Doors & Fixtures. Tucos Products Corp.</p> <p>Traps, Steam. Johns-Manville Corp.</p> <p>Treads, Bridge Floor. Carnegie Steel Co.</p>	<p>Treads, Safety. 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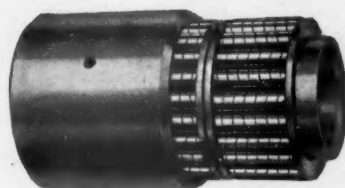


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"In view of the fact that reliable and economical methods of directing train movements by signal indication are now available, it would seem that the American railroads have a lesson to learn from the Irish railways, i.e., that where traffic does not warrant the maintenance of two tracks, studies should be made to determine the economies of removing one track and providing centralized control on the remaining track."*

*Excerpt of editorial in *Railway Age*, January 31, 1931, page 269.

UNION SWITCH & SIGNAL COMPANY
Swissvale, Pennsylvania

GENERAL RAILWAY SIGNAL COMPANY
Rochester, N. Y.

